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THE AUTOMOBILE

# Germany 1, 2 and 3

## Mercedes Wins Grand Prix—Takes First Three Places—France Gets Fourth with England Fifth—Boillot Leads but Goes Out in Last Lap

By W. F. Bradley

### The Race

| CAR | DRIVER | SPEED |
|---|---|---|
| Mercedes | Lautenschlager | 65.55 |
| Mercedes | Wagner | 65.40 |
| Mercedes | Salzer | 64.8 |
| Peugeot | Goux | 64.4 |
| Sunbeam | Resta | 62.6 |
| Nagant | Esser | 61.0 |
| Peugeot | Rigal | 60.6 |
| Delage | Duray | 59.7 |
| Schneider | Champoiseau | 57.7 |
| Opel | Joerns | 56.5 |
| Fiat | Fagnano | 55.5 |

LAUTENSCHLAGER and Mechanician in Winning Mercedes

LYONS, FRANCE, GRAND PRIX RACE COURSE, July 4—*Special Cable*—Germany today won positions one, two and three in the Grand Prix race, the road classic of Europe, defeating a dozen others of the greatest builders of racing machines in Europe and lowering the colors of France, which have floated victorious in French road racing for so many years.

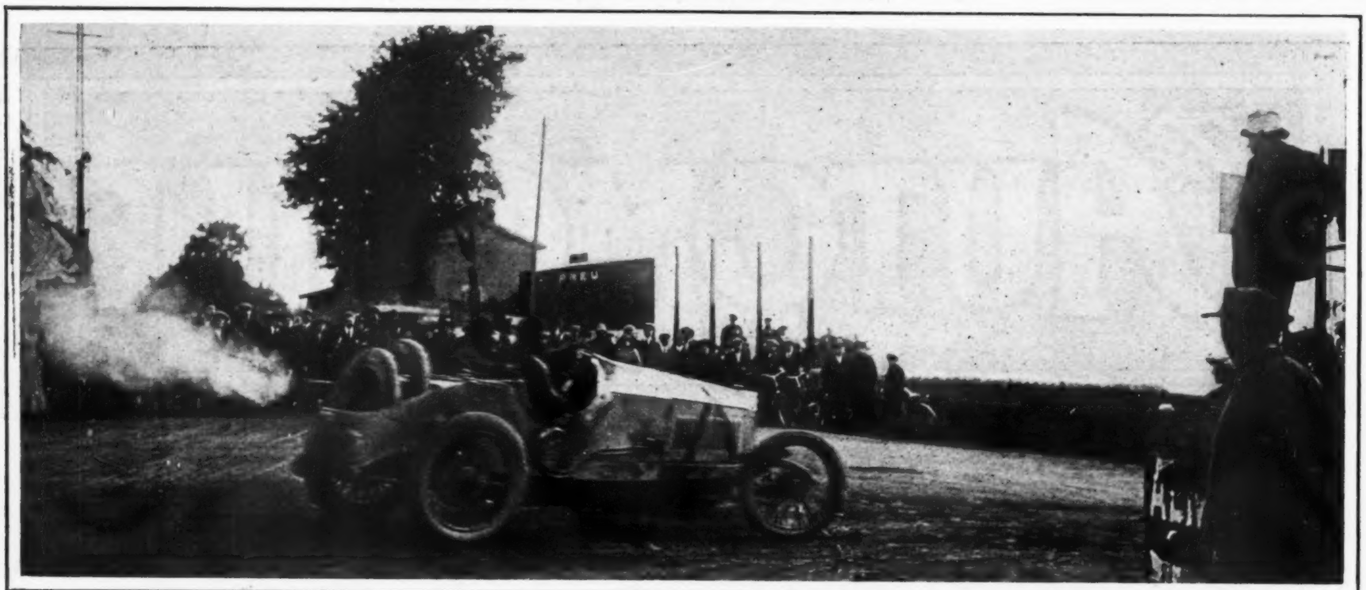
Rarely before, in spite of its historic significance, has the name of Mercedes been higher in the motoring heavens than tonight, for three Mercedes cars flashed winners across the finishing line at the end of the 467.5-mile race over the tortuous 23.3-mile circuit located a few miles out of the city of Lyons.

Lautenschlager, who 8 years ago wrested the Grand Prix race from France in a Mercedes, today was winner, covering the distance in 7 hours, 8 minutes and 18 seconds, a speed of 65.55 miles per hour. His teammates, Wagner, one-time winner of the American Grand Prix race on the Savannah course, and Salzer were second and third. Peugeot was fourth, and the English sunbeam fifth.

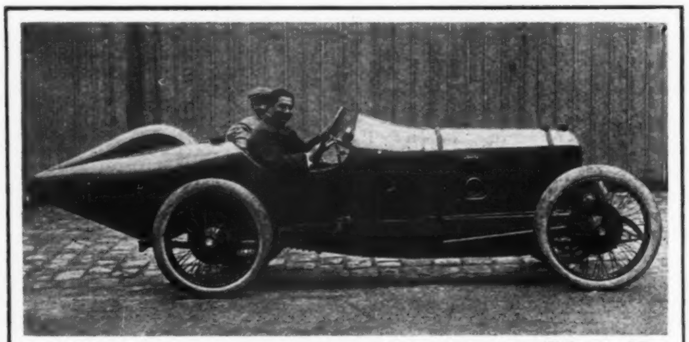
Today has been a clean sweep for the German eagle; in fact, never before has any one maker captured the first three places in so important a racing event.

The best France could do was to have Jules Goux land his Peugeot in fourth place 9.5 minutes back of Lautenschlager and a good 4.5 minutes back of the third Mercedes. It was no case of victory by a few seconds but by a clear margin of several minutes.

But if Mercedes cleared the slate, winning first three places it was not until after the eleventh hour that victory was hers and it was not until a few minutes before the finish that the 300,000 spectators around the course realized that the




Lautenschlager, the winner, sending his Mercedes around the Grand Prix course at top speed



Boillot on 1914 Grand Prix Peugeot

Tricolor of France was lowered and the banner of Germany floating in the zephyrs of victory.

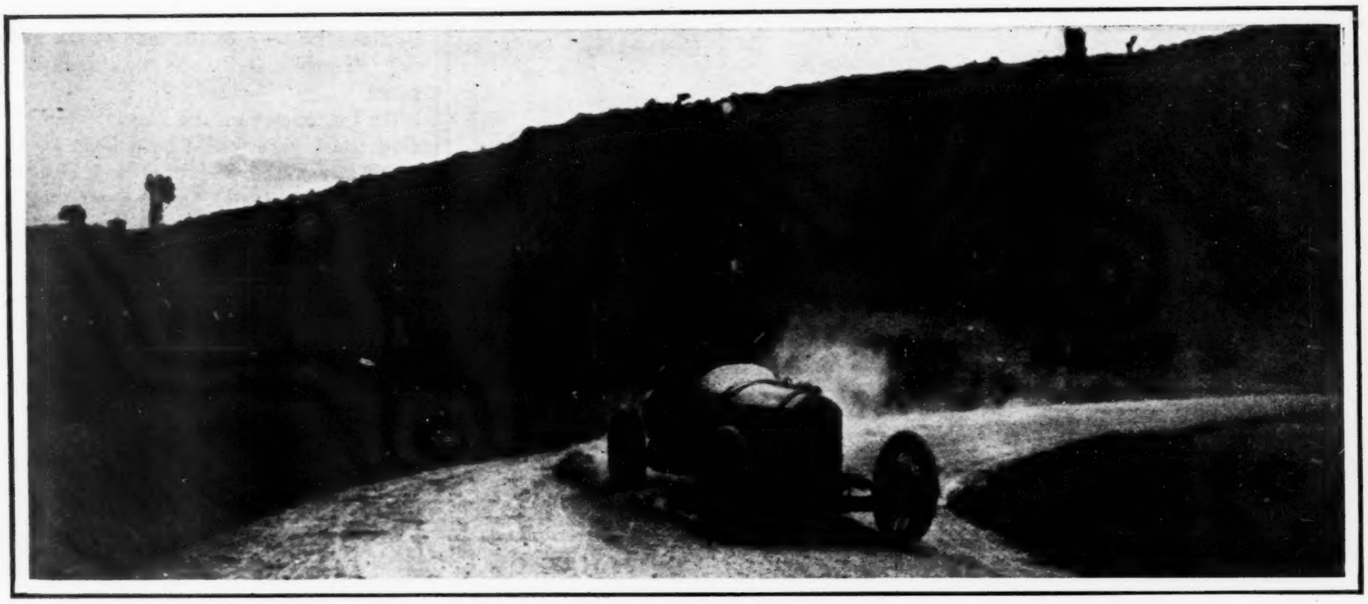
Boillot, winner of the French Grand Prix last year and the year before, was looked upon as the hero today to again carry France to the fore, and his performance justified such expectation, but when half a lap, a short 10 miles from the finish, his Peugeot failed him, the motor broke down, and, heart-broken, he threw up both hands and withdrew.

Boillot had fought with the desperation of a demon from start to finish, for not during a single moment was he free from the terrific onslaught of the five Mercedes cars. Every moment they used German wiles and German force to wear out the greatest road driver that France has produced since the days of Thery, who won three Gordon Bennett races in successive years. Boillot, a man of magnificent stature, and incomparable driving ability, fought the Germans off one by one only to fail when nearly through.

From the start Sailer, driving a Mercedes, set out to maintain a gruelling pace that would wear out any ordinary driver. For five laps, or over 110 miles he kept up the pace and led the field with less than 2 minutes lead on Boillot, who was third, and Duray in a Delage, second. Then Sailer dropped out and Boillot leaped into the lead, having passed the Delage in a few minutes.

When the race was half over, at 230 miles, Boillot was 1 minute and 14 seconds ahead of Lautenschlager, and his team-mate Goux had his Peugeot in third place a good minute ahead of Wagner in another Mercedes and Salzer in the third. At this time Pilette, driving the fifth Mercedes, was out, leaving the trio of Lautenschlager, Wagner and Salzer to worry Boillot and Goux.

Lautenschlager, the winner, in a winning Mercedes, photographed just before the beginning of the French Grand Prix on July 4



Boillot taking one of the sharp turns on the winding descent to the grandstands on the French Grand Prix course

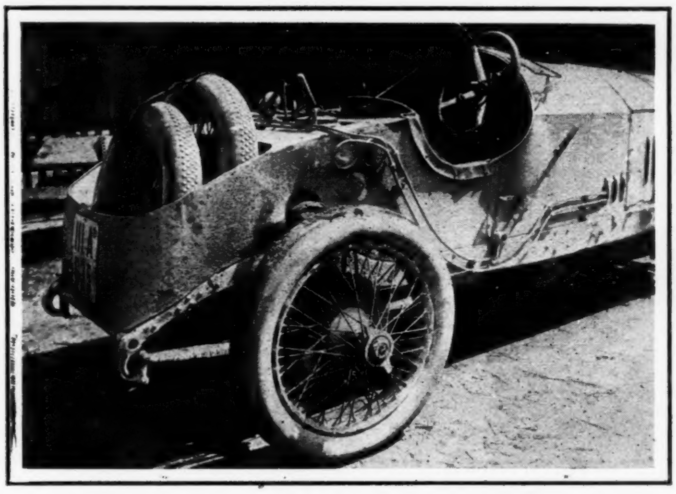
Still Boillot held the lead. Soon after the halfway point, Lautenschlager stopped for gasoline and oil, but instead of Goux stepping into second place as Boillot had hoped his teammate would do, it was the wily Wagner who had passed Goux and was second. A lap later when Wagner had to stop for gasoline and oil, as arranged, it was Lautenschlager who jumped into second position instead of Goux.

There was not a second of letup to the pressure of the German combination. The Mercedes trio fought along lines of a well-laid out plan.

Still Boillot hurled his Peugeot along, maintaining the lead lap after lap until the seventeenth arrived, and but three more had to be covered. For the first time in the race the situation of France became alarmingly critical. Boillot had but 14 seconds' lead on Lautenschlager, Wagner and Salzer were leading Goux, the other hope of France, and Delage, Schneider and other French cars were further to the rear. Peugeot must save the day or France be crestfallen.

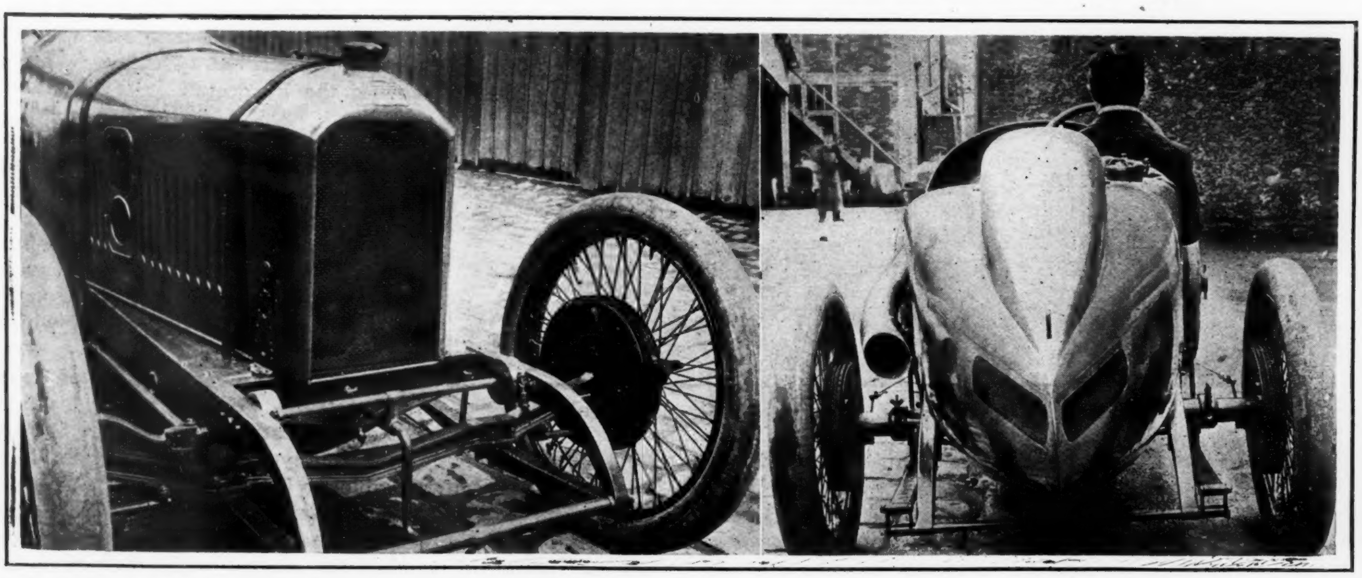
From the Peugeot pits was sent out the signal to Boillot to drive still harder: "Drive like hell" was the order. Boillot and Goux responded, but their herculean efforts failed.

When the eighteenth lap was over Lautenschlager had pushed his Mercedes to the fore and had a clear lead of 33 seconds on Boillot.



Location of fuel tank and cradle for tires on Mercedes

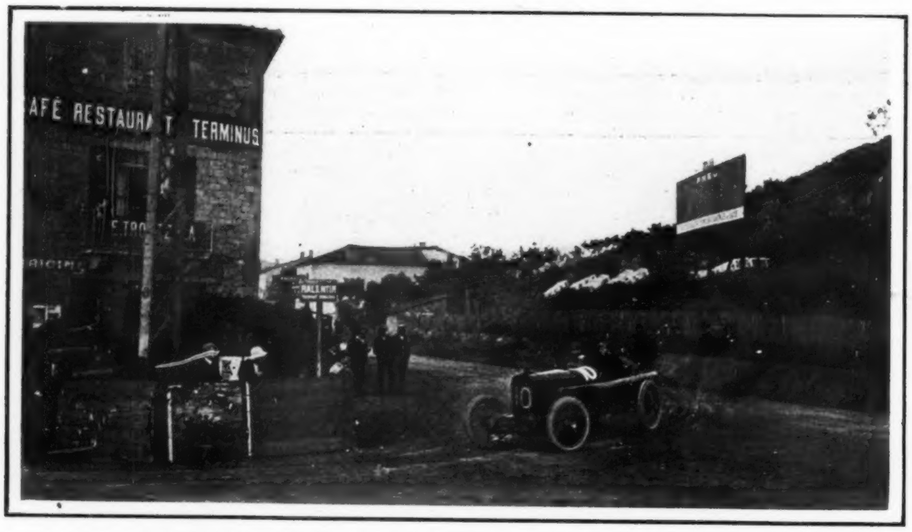
Once again the signals flashed from the Peugeot pit to Boillot to drive still harder. Boillot started into the nineteenth in good shape, but soon signals of distress came. His speed was failing, the motor was not up to par.



Left—Grand Prix Peugeot. Note underslung springs, front wheel brakes and false radiator fronts. Right—Rear of Goux's Peugeot

Fagnano in the Fiat swinging around Death Corner on the Grand Prix course

View of Grand Prix course near end of third leg, and grandstand stretch




Jean Chassagne on the hairpin turn on the grandstand stretch

Lautenschlager was gaining. He jumped his lead to 77 seconds at the end of the nineteenth lap.

But one hope remained for France: "Would the Germans have tire trouble?" But the tire troubles did not come. Boillot, when half through his twentieth lap, was out. His motor broke down, nobody at this writing knows exactly why. Boillot withdrew to the side of the road and France's last hope was dashed to earth.

At the outset of the race it was evident that there would be a keen struggle between the Mercedes and Peugeot cars, and that the Delages would not be factors, although Duray was piloting one of the fastest of them.

Although victors tonight, the Mercedes team of five met two foemen in Boillot and Goux well worthy of their steel, and had the two Peugeot pilots been backed by three such other teammates as comprised the German team, it is questionable if the world would ever have seen a greater struggle. The Mercedes and Peugeot cars behaved admirably and their relative abilities on the road are well illustrated by the struggle which the grandstand witnessed between Lautenschlager and Goux in the fifteenth lap.

### A Neck-and-Neck Race

Lautenschlager and Goux were almost neck and neck on the winding descent opposite the grandstand. Goux was slightly behind, but with his front wheel brakes he could approach the curves at a higher speed than the Mercedes. At Death Corner he was afraid to take the risk. At 150 yards farther on at the second bend he was within arm's length of Lautenschlager, but again he dared not pass him. The same thing happened on the third bend of the course. Finally the two racers reached the straightaway down stretch approaching Sept Chemins hairpin turn. Here Goux opened up the Peugeot to the full, and after running wheel to wheel for a few yards got ahead of Lautenschlager 20 yards before the turn was reached. Goux thus passed in front of the grandstand a couple of seconds ahead of Lautenschlager, but although he was leading in road position, he was still behind the German on elapsed time. It was not long before Lautenschlager again passed the Peugeot.

### Germany Prevails

The three Germans drove a hounding race like this from start to finish, and by sheer might wore down Boillot and Goux, who were pushed as never before in a road race. The Mercedes drivers with three of them running so strongly could afford to take chances of which Boillot was afraid.

But little better fortune awaited Goux in the other Peugeot. On the last lap but one he lost third position to Salzer, driving the Mercedes, and finally came in fourth, exactly 9.5 minutes back of the winning Lautenschlager.

That but eleven of the thirty-eight cars to start were able to finish proved the gruelling nature of the struggle. Over 300,000 spectators watched the contest which was remarkably free from accidents from start to finish, only two drivers

suffering slight injuries. One of these was Sisz, familiar to American readers as having won the first French Grand Prix in a Renault and having competed in American Grand Prize races on the Savannah course in a similar make of car. Today he drove an Alda and raced in hard luck throughout. He changed a radiator early in the race and later was working on a tire by the roadside when he was struck by one of the Opels. His shoulder was dislocated and he was severely bruised. The mechanician brought the car to the pits where it remained.

Tabuteau, in another Alda, overturned on a difficult winding stretch of the road, but was not severely injured.

Opel on hairpin turn near the grandstands on French Grand Prix course

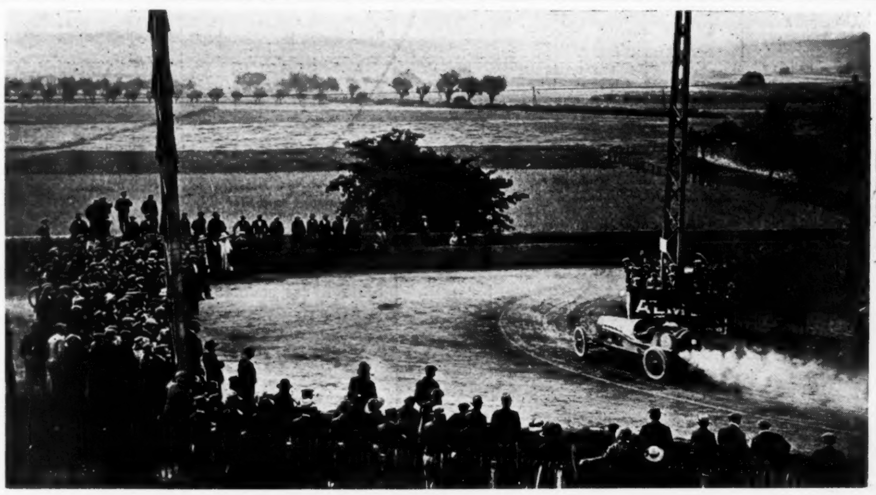
**Delage Fast in Trials**

In the trials the Delage cars had shown themselves faster than the Peugeots and quite the equal of the Mercedes. They had been prepared with minute care. The race was scarcely started when it was seen that Bablot, one of the drivers, and the most reckless of the trio, had comparatively little speed. Guyot, one of the other Delage pilots, who recently won fourth place at Indianapolis, could not make more than a commonplace showing.

Bablot on the Delage swinging around the turn near the grandstands

Before the race all three of the Delages had experienced trouble with backfiring into the carbureters, and thinking to obviate this defect, which was supposed to arise from a slightly imperfect seating of the positively operated valves, which are opened and closed by cams, rather than the closing being effected by a spring, a new adjustment was made a few hours before the start of the race. This proved a costly error, for immediately the speed of the engine dropped and the engine power was cut down considerably. Bablot never got better than twelfth place, and Guyot once reached eighth position. Finally both Bablot and Guyot withdrew disheartened, two laps before the finish of the race rather than come in tail-enders.

This was the first occasion in which the Delage in a French race has failed to finish a complete team of three cars.



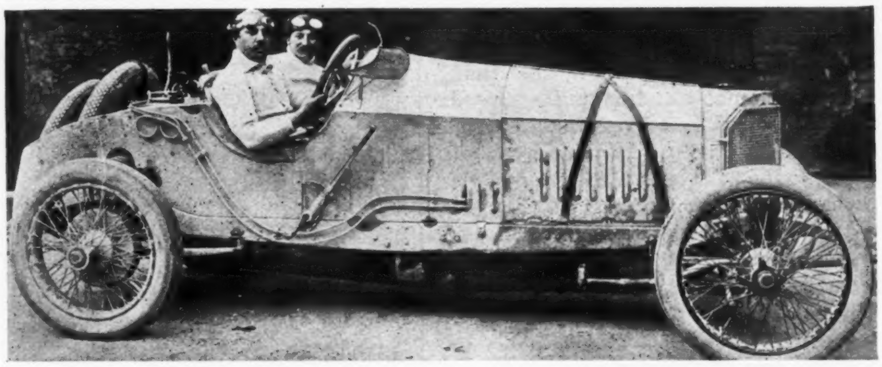
Scales on the Fiat hugging the pole on Death Turn

**One English Finisher**

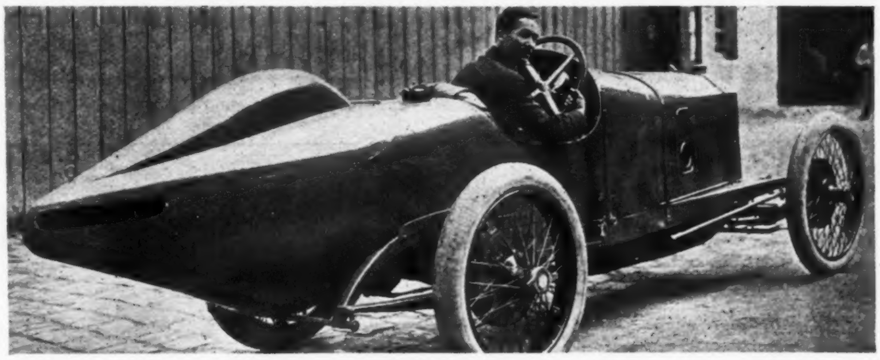
England, represented by six cars, three Sunbeams and three Vauxhalls, had but one finisher of the eleven starters, Resta finishing in a Sunbeam in fifth place. The Vauxhall cars are considered the finest racing productions and represent the most up-to-date design, but they were too green for a contest of this nature. The cars and drivers were altogether unprepared for the race, and it was with difficulty that the cars were ready in time to be weighed in, and only 24 hours before the start of the race all three were completely dismounted. Ralph DePalma, the American driver, pilot of one machine, realized before starting that he had little chance of finishing. Hancock, driving one of the Vauxhalls, was more than 2 hours making the first lap, at the end of which he abandoned the race. Watson, one of the other drivers, required about the same time to complete the circuit and withdrew, leaving only DePalma, who struggled hard against fate, covering the first lap in 26:29, as compared with 21:11, the best time for

the initial circuit, made by Sailer in the Mercedes. DePalma completed the second circuit in about the same time, was a little faster in the third and fourth, and after he had completed the fifth he pushed his car off to the side of the road.

The three Sunbeam cars made a better showing, and although Resta was but able to get fifth place, the Sunbeam was the third make of car to finish. When five laps, or the first quarter of the race was over, Guinness, driving a Sunbeam, and the winner of the recent Isle of Man road race, was in fourth position, scarcely 2 minutes behind Sailer, the Mercedes that was leading at that point, and ahead of Lautenschlager, Goux and Wagner. Chassagne, driving another Sunbeam, was in twelfth place, and Resta was further back. With the race half over, Guinness withdrew with a broken piston head, having held fourth position from the fifth lap until that time. Chassagne was forced out on the thirteenth lap when running in seventh place, due to a broken bolt on the end of a connecting-rod. The performance of Resta was a consistent one from start to finish. At the end of the first quarter he was below fifteenth place; when the



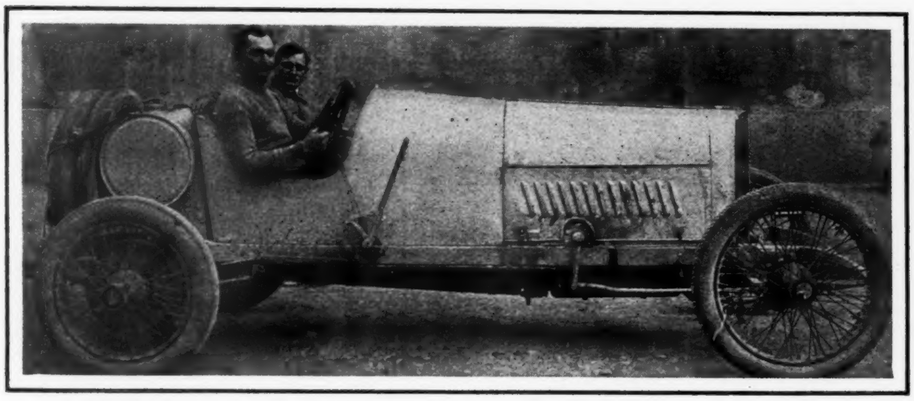
Salzer on the Grand Prix Mercedes before the race. Note cross strap on bonnet



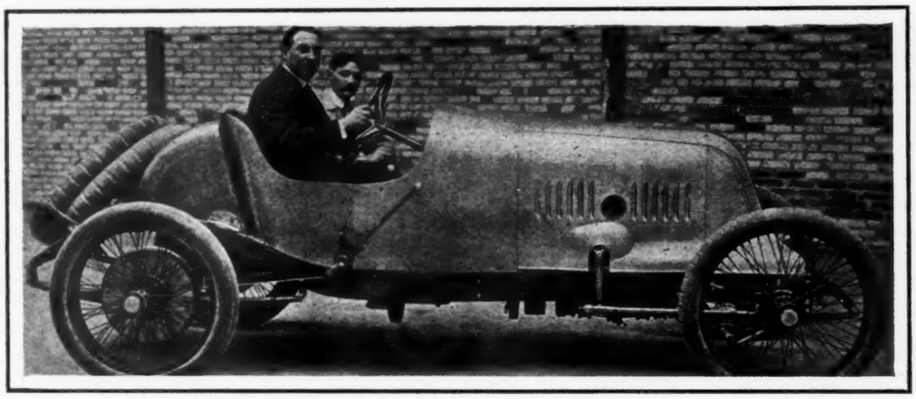
Goux on Peugeot Grand Prix racer. Note streamline tail to minimize wind resistance

## Characteristics of Cars Entered in the French Grand Prix Run

| Make | Drivers | Bore and Stroke | Valves | Main Bearings | Oiling | Ignition | Carbureter |
|---|---|---|---|---|---|---|---|
| Alda (France) | Tabuteau<br>Pietro<br>Sisz | 94.5x160<br>3.7x6.3<br>Four-cylinder monobloc | Sixteen overhead | Five plain | Variable splash | Bosch double | Zenith |
| Delage (France) | Paul Bablot<br>Albert Guyot<br>Arthur Duray | 94x160<br>3.7x6.3<br>Four-cylinder monobloc | Sixteen overhead, two camshafts | Five ball | Centrifugal | Bosch single | Claudel |
| Peugeot (France) | Georges Boillot<br>Jules Goux<br>Victor Rigal | 92x162.5<br>3.6x6.4<br>Four-cylinder monobloc | Sixteen overhead, two camshafts | Three ball | Pump circulating | Bosch single | Zenith |
| Th. Schneider (France) | Champoiseau<br>Gabriel<br>Juvanon | 94x160<br>3.7x6.3<br>Four-cylinder monobloc | Eight inclined in head, one camshaft | Roller | Centrifugal and pump | Bosch | Claudel |
| Sunbeam (England) | Jean Chassagne<br>Darius Resta<br>K. Lee Guinness | 94x160<br>3.7x6.3<br>Four-cylinder monobloc | Sixteen overhead two camshafts | Three ball | Pump circulating | Bosch | Claudel |
| Vauxhall (England) | A. J. Hancock<br>Ralph De Palma<br>W. Watson | 101x140<br>3.9x5.5<br>Four-cylinder monobloc | Sixteen overhead, two camshafts | Five plain | Pump circulating | High tension | Zenith |
| Aquila-Italiana (Italy) | Beria d'Argentina<br>Marsaglia<br>Constantini | 85x130<br>3.3x5.1<br>Six-cylinder monobloc | Eight overhead, inclined | Three ball | Pressure | High tension | Zenith |
| Fiat (Italy) | Cagno<br>Fagnano<br>Scales | 100x143<br>3.9x5.6<br>Four-cylinder monobloc | Eight overhead, one camshaft | Three plain | Pressure | Bosch double | Fiat |
| Nazzaro (Italy) | Felice Nazzaro<br>Porporato<br>Cenisio | 94x160<br>3.7x6.3<br>Four-cylinder monobloc | Sixteen overhead, inclined | Three ball | Pressure | Bosch double | Zenith |
| Piccard-Pictet (Switzerland) | P. Tournier<br>Th. Clarke | 97x150<br>3.8x5.9<br>Four-cylinder monoboc | Single sleeve | Five plain | Pressure | Bosch | Zenith |
| Nagant (Belgium) | Leon Elskamp<br>D. Esser | 94.8x158<br>3.7x6.2<br>Four-cylinder monobloc | Sixteen overhead, two camshafts | Three ball | Splash, pressure hand pump | Bosch single | Nagant |
| Mercedes (Germany) | Lautenschlager<br>Louis Wagner<br>Pilette<br>Salzer<br>Sailer | 93x165<br>3.6x6.4<br>Four separate steel jackets | Sixteen overhead, inclined, one camshaft | Five plain | Circulating | Two Bosch doubles; four plugs per cylinder | Mercedes |
| Opel (Germany) | Joerns<br>E. Erndtmann<br>F. Breckheimer | 94x160<br>3.7x6.3<br>Four-cylinder monobloc | Sixteen overhead, one camshaft | Five plain | Pressure | Bosch single | Ope |



Carl Joerns on the Opel, photographed before the French Grand Prix race July 4



Champoiseau on Schneider. Note form of bonnet with radiator in front under hood

race was half over he was in eighth place, and at the finish he was fifth with his car working perfectly.

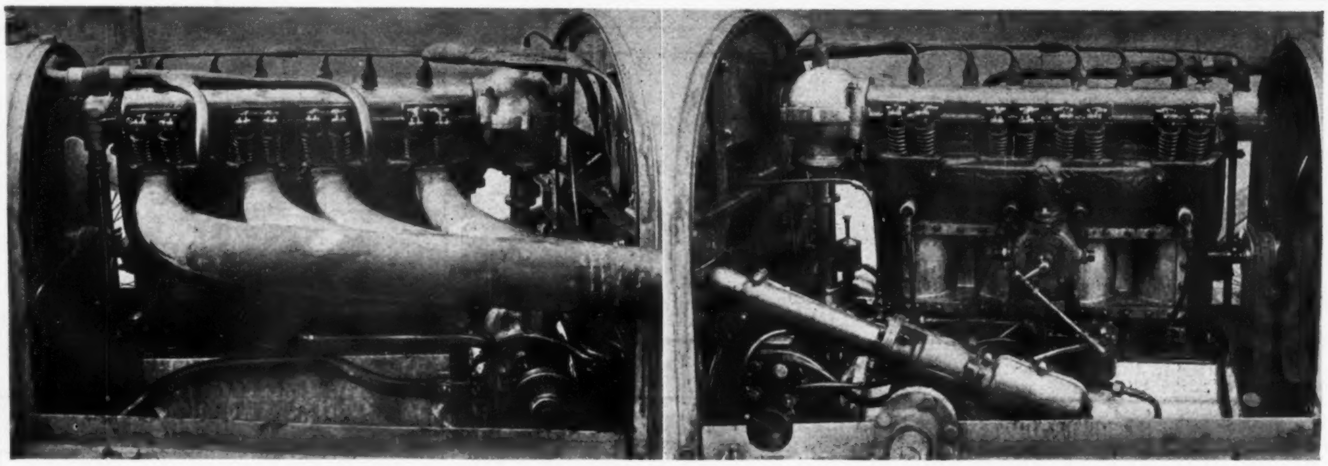
The three new Fiat cars made a favorable impression, and one of them, driven by Fagnano, finished eleventh, 34 minutes back of the leader. Cagno, one of the Fiat drivers, had trouble with pre-ignition from the start of the race, and this trouble also delayed Scales, driving the third Fiat. Fagnano drove a consistent race and was in ninth position at the end of five laps with his teammate, Scales, in eleventh place. At the halfway point Fagnano was seventh.

Felice Nazzaro, an Italian race driver, well known in America, from the days when he piloted Fiat cars, had three of his new Nazzaro machines entered, none of which was ever important factors in the race. Nazzaro, himself piloting one, was forced to abandon the contest early.

Switzerland was represented by two Piccard-Pictets, which are single sleeve motors, built under the Argyll license. Each sleeve has a double movement, a reciprocating one and a part rotating one. The sleeves gave no trouble, but both cars were withdrawn, due to chassis defects.

**at Lyons, July 4, 1914. Cylinder Capacity 274.6 Cubic Inches.**

| Cooling | Clutch | Gears | Drive | Drive Taken Through | Brakes | Wheelbase and Track, Inches | Wheels | Tires |
|---|---|---|---|---|---|---|---|---|
| Pump | Cone with Raybestos | Four and reverse | Shaft | Central tube | On differential and rear wheels | 106<br>53 | Rudge-Whitworth | Pirelli<br>34.4x4<br>34.6x4.7 |
| Pump<br>No fan | Multiple disc | Five; direct on third | Shaft | Springs | Front wheels<br>Differential<br>Rear wheels | 106<br>53 | Rudge-Whitworth | Pirelli<br>34.6x4.7<br>35x5 |
| Pump<br>No fan | Cone, leather faced | Four; direct on fourth | Shaft | Springs | Front wheels<br>Differential<br>Rear wheels | 106<br>53 | Rudge-Whitworth | Dunlop<br>34.4x4<br>34.6x4.7 |
| Pump<br>No fan | Cone | Four; direct on third | Shaft | Torque member | Differential<br>Rear wheels | 110<br>54 | Rudge-Whitworth | Dunlop<br>34¼x3.5<br>34.6x4.7 |
| Pump<br>No fan | Cone | Four; direct on fourth | Shaft | Springs | Differential<br>Rear wheels | 106<br>53 | Rudge-Whitworth | Dunlop<br>34.6x4<br>34.6x4.7 |
| Pump<br>No fan | Cone | Four; direct on fourth | Shaft | Tube and spherical joint | Differential<br>Rear wheels | 111<br>54 | Wire | 34.6x4.7 |
| Pump | Multiple discs | Four; direct on fourth | Shaft | Central tube | Differential<br>Rear wheels | 106<br>56 | Rudge-Whitworth | Pirelli<br>34.4x4<br>34.6x4.7 |
| Pump<br>No fan | Multiple discs | Four; direct on fourth | Shaft | Springs | Front wheels<br>Differential<br>Rear wheels | 110<br>52 | Rudge-Whitworth | Pirelli<br>34.4x4<br>34.6x4.7 |
| Pump | Dry discs | Four; direct on fourth | Shaft | Central tube | Differential<br>Double on rear wheels | 107<br>54 | Rudge-Whitworth | Pirelli<br>34.4x4<br>34.6x4.7 |
| Pump | Discs | Four; direct on fourth | Shaft | Springs | Front wheels<br>Differential<br>Rear wheels | 104<br>52 | Rudge-Whitworth | Continental<br>34.4x4<br>34.6x4.7 |
| Pump | Discs | Five; direct on fourth | Shaft | Springs | Differential<br>Rear wheels | 110<br>53 | Rudge-Whitworth | Dunlop<br>34.6x4.7 |
| Pump | Cone | Four; direct on fourth | Shaft | Tube and torque member | Differential<br>Rear wheels | 111<br>53 | Rudge-Whitworth | Continental<br>34.6x4.7<br>35x5 |
| Pump | Cone | Four; direct on fourth | Shaft | Springs | Differential<br>Rear wheels | 118<br>53 | Rudge-Whitworth | Continental<br>31.8x4<br>34.6x4.7 |



Left—Exhaust side of Opel sixteen-valve motor. Right—Intake side Opel motor. Note drive of overhead camshaft

# All Cars Are of Special Design

## Participants in Grand Prix Embody Latest European Engineering Developments

LYONS, FRANCE, June 24—Of the thirty-eight cars to start in the Grand Prix race here on July 4, which represent thirteen different European makers, two restrictions have been kept in mind:

First: The piston displacement is 4 1-2 liters, in other words 274.6 cubic inches. This means a four-cylinder motor of approximately 3 13-16 x 6-inch bore and stroke. In reality the majority of the cars entered are 3.7 x 6.3 inches, which in millimeters is 94 x 160. Some of them are 93 x 165. In not a single case is the stroke-bore ratio 2 to 1. It is 1.4 to 1 in Fiat and Vauxhall, 1.83 to 1 in Peugeot and 1.7 to 1 in practically all of the others.

Second: These thirteen manufacturers have had to build to a weight not exceeding 2,425 pounds total. This has meant a careful selection of material, using the best steels and proportioning weight to strength.

**Six Nations Represented**

For the first time since France has held a Grand Prix, this race is really international, in that France has twelve cars, representing four companies; Germany has eight, representing three companies; England has six, representing two companies; Italy has nine, representing three companies; and Switzerland and Belgium two each representing one firm. Mercedes has five cars entered, and the majority of the other makers three each.

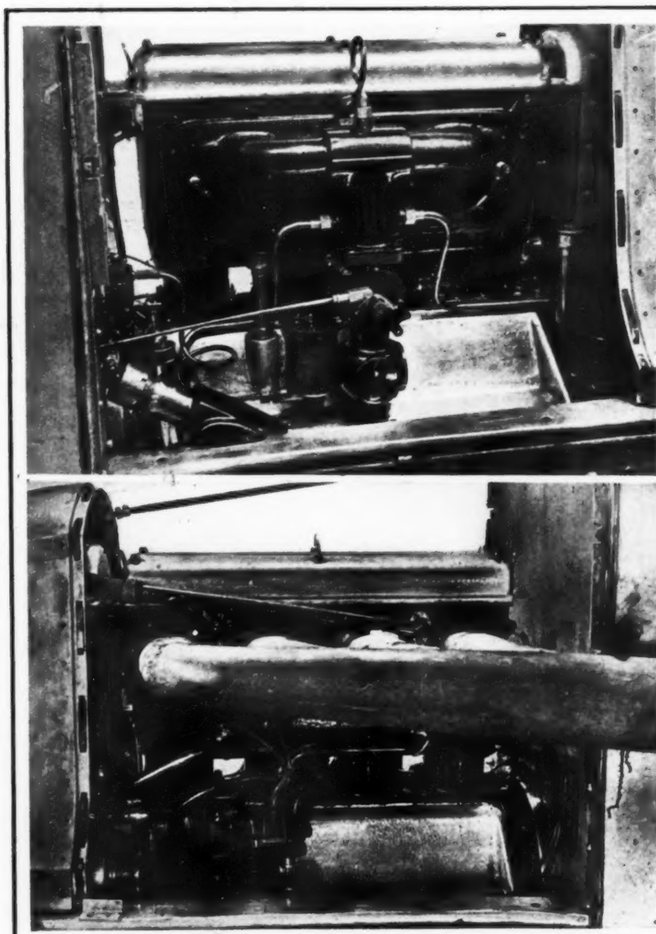
All of the cars without a single exception have been built to meet the requirements of the rules, and it is impossible to find a single car that has been assembled from stock parts and has been entered with the view of cheap publicity. All are the epitome of the best that Europe can provide in design and construction. Their secrets are vigilantly guarded and Mercedes has refused to give any information on its motors.

**Four-Cylinder Motors Supreme**

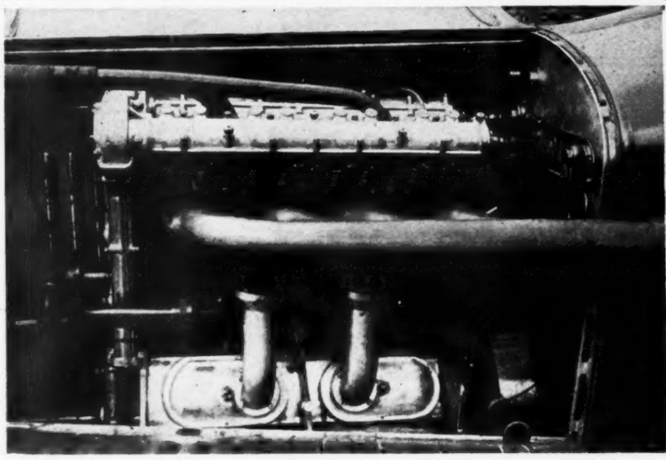
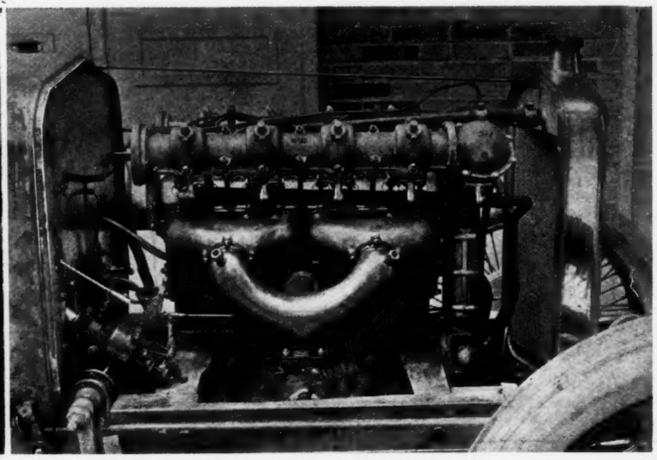
All of the motors are four-cylinder types with the single exception of the Aquila-Italiana, which uses a six, and which may not start in the race.

With but the single exception of the Mercedes, block castings are used on all the motors, the Mercedes company using separate forged-steel cylinders to which the water-jacket is welded. Mercedes built two sets of cars for this race, one with six-cylinder motors, the other with four cylinder ones, and after long road tests decided in favor of the fours.

All cars show a decided trend towards the use of ball bearings for the crankshaft, 6 of the 13 makes using them. Six others employ plain bearings and one uses roller. Built-up crankshafts made from two or more pieces are frequently necessary in order to properly fit the ball bearings.



Upper—Intake side of Alda motor. Lower—Exhaust side of Alda motor with sixteen overhead valves

Left—Exhaust side of Peugeot motor. Right—Intake side Delage sixteen-valve motor without valve springs

At this date it is impossible to get the exact valve sizes, but in several of the best cars where there are four valves per cylinder the diameters range between 1.7 and 1.8 inches.

**Valve Timing Figures**

Valve timing is also difficult to obtain and the following may be taken as approximately that of three of the leading makes:

Intake opens 12 degrees after center; intake closes 45 degrees after center; exhaust opens 45 degrees before center; and exhaust closes 18 degrees after center.

Great attention has been given to details of lubrication, and there is a tendency towards the use of a system in which all oil is pumped out of the base chamber, being delivered to the bearings from a tank set elsewhere in the frame. Thus isolated from the heat of the motor the oil cools before being circulated through the bearings.

**Double Magnetos in Vogue**

Single and double high-tension magnetos are equally employed. By double ignition is meant one magneto with two distributors, firing two plugs in synchronism in each cylinder. Mercedes has gone further, firing four plugs in synchronism in each cylinder, by means of fitting two double magnetos.

Pump circulation of the water is used in every case, even where stock models use thermo-syphon. Two firms that have carried the radiator on the dash in stock productions have fitted it in front in their racers.

**Four-Speed Gearbox Essential**

The nature of the 23-mile course has made a four-speed gearbox essential. There are some straightaway stretches of a switchback nature where the limit of speed is the ability of the car to hold the road. Because of this several makers are using a geared up fourth with direct on third. Delage uses 5 forward speeds with fourth and fifth geared up. Nagant uses 5 speeds with fourth direct and fifth geared up.

Every car is shaft driven with a bevel rear axle. In general springs are relied upon to take the drive and the torque.

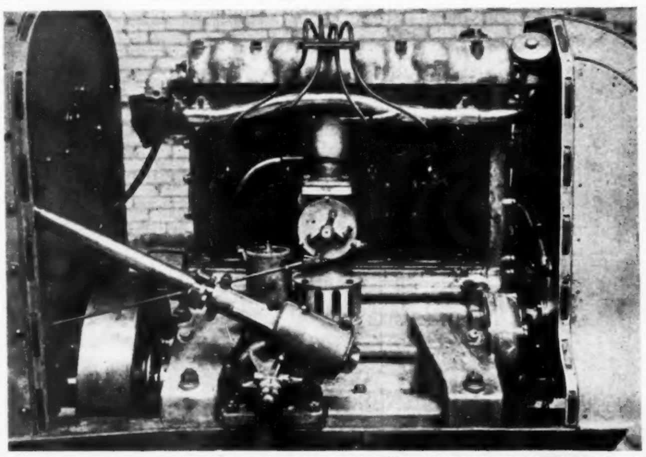
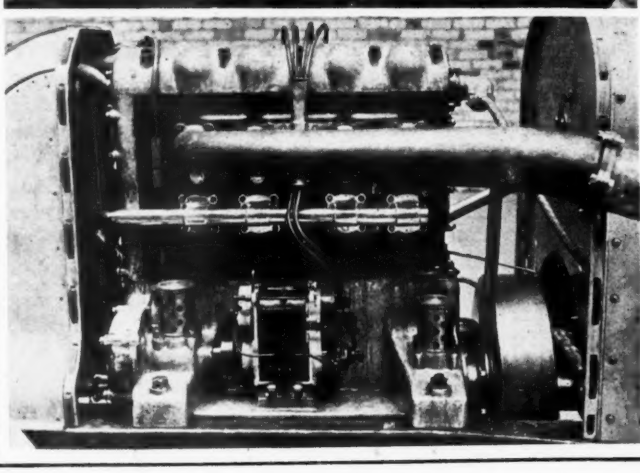
Brakes have received much attention because of the many curves on the course, Delage, Peugeot, Fiat, and Piccard-Pictet fitting front wheel brakes. Every car in the race has wire wheels, which is ample proof of the merit of these wheels when the tortuous nature of the course is considered.

The keynote of all the motors is the hemispherical type of combustion chamber together with overhead valves and some form of overhead valve mechanism. This design is found on every car in the race, excepting the Piccard-Pictet, which is a single-sleeve type built on the Argyll patents with the sleeve reciprocating and also giving to and fro rotary motion.

**Sixteen Valves the Rage**

Some of the leading valve arrangements are illustrated on these pages. Of the thirteen different makes of cars, nine are designed with four valves in the head of each cylinder, two intakes and two exhausts, the only two companies of note using but two valves per cylinder being Fiat and Schneider. Where the valves are inclined at 45 degrees or thereabouts, two camshafts are generally used, but where the valves are mounted vertically in the cylinder head, one overhead camshaft suffices.

All entrants have recognized the superiority of the overhead valves and firms which a year ago raced with L or T-head motors have been obliged to come out boldly for the

Upper—Intake side of Schneider motor. Note radiator filler cap under hood Lower—Exhaust side of Schneider motor

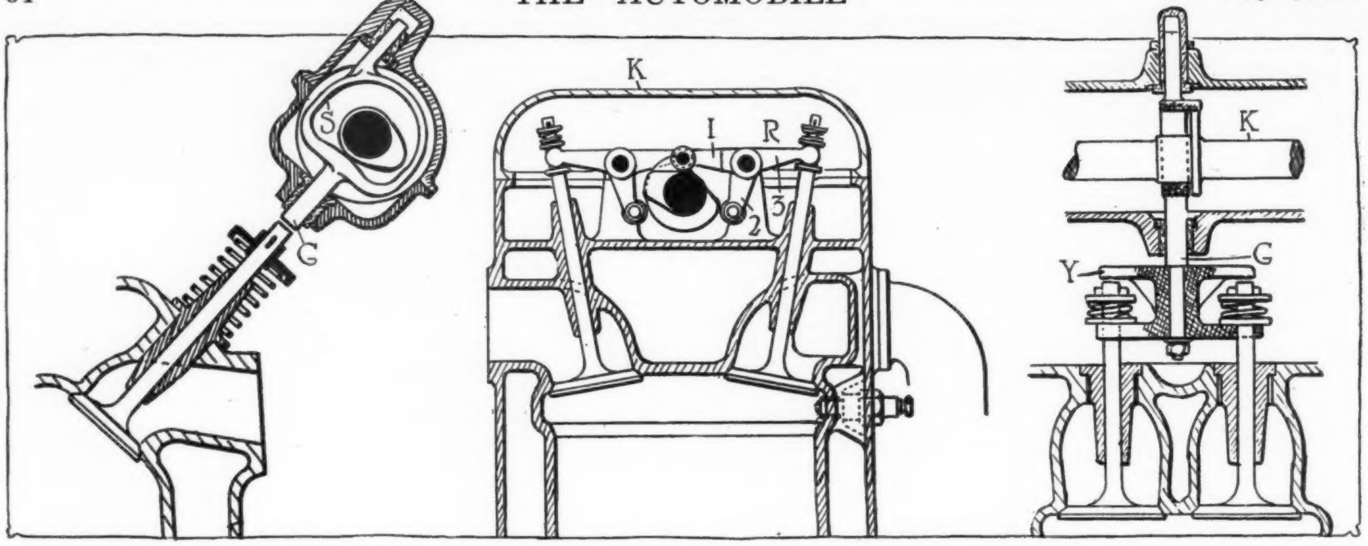


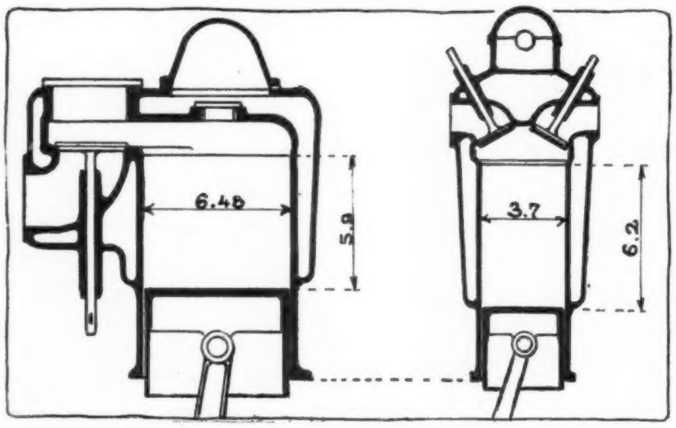

Fig. 1—Left—Peugeot valve arrangement, sixteen inclined valves with direct cam operation for motor head camshaft. Same design is found on Sunbeam, Vauxhall and Nagant. Fig. 2—Center—Schneider, eight valves inclined, double cam. No springs. Fig. 3—Right—Delage, showing pair of valves positively operated without springs

overhead type. Examples are Sunbeam, Vauxhall and Alda.

The ever-increasing question of motor speed has demanded greater attention to valves, and this has been particularly necessary this year with the piston displacement reduced to 274.6 cubic inches. The average crankshaft speed in a race may be put down at 2,600 to 2,700 revolutions per minute. Not a few motors will run at 3,000 revolutions per minute and over, and it is quite the exception to find motors to run below 2,500 revolutions per minute.

### Peugeot Valve Scheme

These high speeds have caused prolific valve troubles as well as troubles with the valve-operating gear. Either valves refused to operate correctly above a certain speed, or the heavy springs employed to secure a quick seating of the valve wore away the cam. The type of valve-operating gear which the Peugeot used has found considerable following. This provides practically a direct operating cam, there being two overhead camshafts, each inclosed in an independent aluminum housing and located nearly above the valve stems. The two camshafts are driven by a single train of spur gears. Fig. 1 shows the Peugeot scheme, the cam operating in what may be termed a stirrup S, having a couple of projections to serve as guides. The lower of these guides G is in direct contact with the valve stem. This piece is unusually light and is the only intermediary between the cam and the valve. Peugeot designed its type of valve mechanism and used it in last year's race and has continued it this year. It appears in general design on Sunbeam, Vauxhall, and Nagant.




Left—Winning motor 1906. 778 cubic inches, 1200 r.p.m., 105 horsepower, 90 m.p.h. Right—Winning motor 1914. 274.6 cubic inches, 3000 r.p.m., 130 horsepower, 108 m.p.h.

Delage in his latest type of valve gear has abolished valve springs entirely, each of the sixteen valves being positively opened and positively closed. Figs. 3 and 4 show a section of the cylinder head of the Delage with a valve mounted at approximately 45 degrees and using two camshafts mounted in line with the valve stem. There are sixteen valves and the camshafts are driven by bevel gearing through a vertical shaft and set of bevel gears, all being inclosed in oil-tight aluminum cases. In order to give additional rigidity to the overhead structure the two camshaft housings are united at the rear by an aluminum cross-member.

Valve springs are not used, that is to say, springs are not relied upon primarily to bring the valves back to their seats. The cam operates within the stirrup-shaped member S, with its two projecting stands, one outward and the other G towards the valve stem, where it passes into and is securely attached to a very light double-yoke Y. The valve stems for the two intake or exhaust valves for each cylinder are received in this yoke, and as the yoke has a positive reciprocating motion it opens the valves on the downward movement and closes them on the return. There is a very light coil spring on each valve stem between the arms of the yoke, but this spring is in no way responsible for the return of the valve, but merely serves to secure the final seating of the valve, in view of the clearance which must be left between the push member and the valve stem.

### Schneider Without Valve Springs

The Schneider like the Delage has abolished valve springs, making use of double cams, Fig. 2, which give a positive return or closing movement to the valve. There are only two valves per cylinder and these are inclined but 10 degrees from the vertical. They are operated by a single camshaft driven by an inclosed train of spur pinions at the front of the motor. The rocker arm R for each valve has three arms, designated respectively 1, 2 and 3. The double cams operate on arms 1 and 2 to respectively open and close the valve and the arm 3 has a yoke N which spans the valve stem and operates between collars on the stem. The entire valve mechanism is compactly hidden under a single aluminum cover K which completely encases the top of the motor. The spark plugs are located on the side just below the intake valve.

### Alda Has Hollow Camshaft

In the Alda motor the sixteen valves are inclined at an angle of approximately 30 degrees to the vertical and are operated by a single hollow camshaft carried in plain bearings in a separate compartment of the cylinder head. There is a separate rocker arm for each valve, this rocker arm

having a roller on the inner end where it bears on the cam and another on the outer end where it bears on the valve stem. An aluminum cover extending the full length of the motor incloses the entire valve mechanism. The camshaft is driven by a train of spur pinions in front.

**Opel's Overhead Valves**

The overhead valve mechanism of the Opel with its sixteen inclined valves is much similar to that on the Alda, excepting that the valve springs are not inclosed, although the camshaft is encased in a compact compartment. The valves, Fig. 5, are inclined approximately 35 degrees from the vertical, and there is a rocker arm for each valve, the rocker arm having a roller on its inner end and an adjusting screw on the outer end where it bears on the valve stem. The camshaft is driven from the rear by a vertical shaft with double gearing.

**Fiat's High-Speed Début**

This is the first year that Fiat has come out with a small high-speed racing motor, having heretofore been an exponent of large type power plants. Double intakes and exhausts are used in each cylinder and these are mounted at approximately 40 degrees from the vertical and are operated by a single camshaft, Fig. 7, mounted centrally in a compartment over the cylinder head. There is a separate rocker arm for each valve and the camshaft actuates these rocker arms through vertical push rods, or plungers P with rollers on their lower end contacting with the cams. Each rocker arm carries an adjustment on its inner end and an arch-shaped outer end for contacting with the valve stem. Camshaft is supported in a hollow of the cylinder head which takes a steel covering, this cover carrying the plungers for the rocker arms.

**The Silent Mercedes**

Evidently the Mercedes men are sworn to absolute silence for it is impossible to get from them any statement regarding their cars. In general the motors used in all five are alike, and are similar to the aviation type used a year ago. They use separate steel cylinders which are forgings, not castings, and are turned from the solid stock. To these the aluminum jackets are autogenously welded. There are sixteen overhead valves, four per cylinder, operated through rocker arms from a single camshaft. Two Bosch double magnetos are used, thus giving four synchronized sparks per cylinder. The cylinders are 93 x 165 mm. which is 3.6 by 6.4 inches bore and stroke. The crankshaft is carried on five plain bearings, the gearset gives four speeds with direct and fourth, and a cone clutch is used.

The cars have that type of streamline body developed a year ago and use a V-type radiator. The spare wire wheels are carried in a rear compartment instead of being strapped

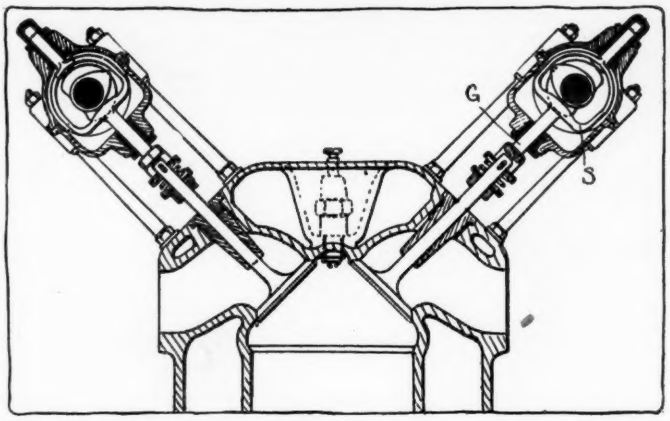



Fig. 4—Delage arrangement with sixteen inclined overhead valves operated by cams

on, the streamline effect of the body being carried out in this.

The new Peugeot racers have more external changes than internal features, as the engineers responsible for them have been content to carry out last year's design with reduction in cylinder size to meet the new rules. No essential modifications have been made in the motor, and the gearbox and the rear axle are the same with the exception of ratio. Externally the cars are much lower than formerly owing to the front springs being under the axle.

**Latest Peugeot Design**

From the question of streamline body design these cars are the finest entered in the race. The radiator is narrow and of W-cross section although this cannot be noticed by the casual observer as the wire guard is set in the radiator frame, and its V-form might be mistaken for the radiator itself.

The bonnet, with the usual hand-hole for reaching the carbureter is continued rearward by a scuttle dash nearly up to the height of the steering wheel. A streamline tail is used which entirely encases the gasoline tank and the spare wheels. There is a hump on the top of the tail and a similar one on the base of it to accommodate the wheels. The whole of the rear portion of the body back of the tank forms a hinged cover with an eyebolt set in the extremity so that the mechanism can open the lid, thus exposing the tires while the car is being brought to a standstill. Even the under pan has received close attention and narrows as it extends rearward so that it just encases the driveshaft and forms a continuation of the tail broken only enough to allow the passage of the axle.

Braking is done on all four wheels, there being internal expanding bands operating in ribbed drums. In addition the usual brake is carried on the rear of the gearbox.

(*Continued on page* 103)

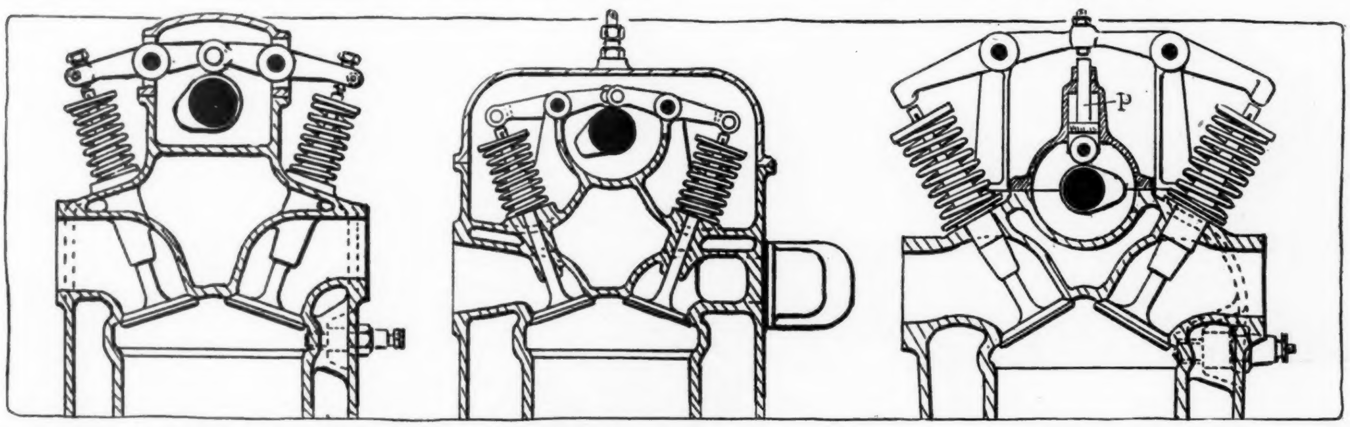
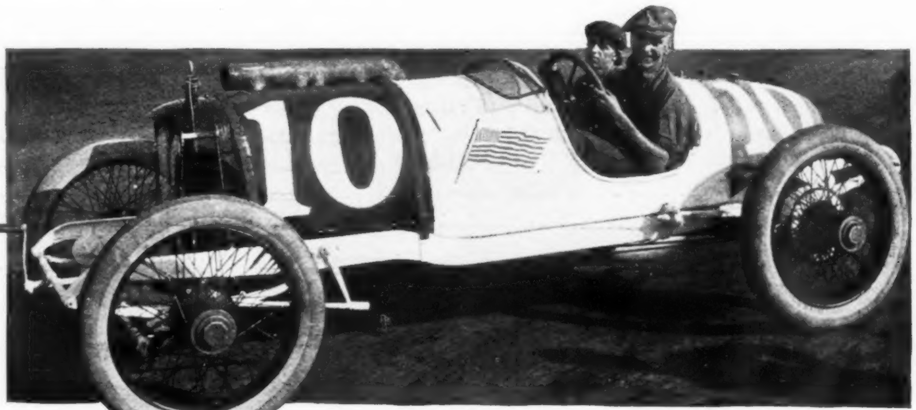



Fig.5—Left—Opel, sixteen overhead valves, one camshaft, ten rocker arms, external springs. Fig. 6—Center, Alda, sixteen overhead valves, single camshaft and light rocker arms, all enclosed. Fig. 7—Right—Fiat, single camshaft push rod, rocker arms and eight inclined valves

# Rickenbacher Wins 300-Mile Race At 78.6 Miles Per Hour

**THE FINISHERS**

| Car | Driver | Speed |
|---|---|---|
| Duesenberg | Rickenbacher | 78.6 |
| Mercer | Wishart | 78.3 |
| Duesenberg | Alley | 74.4 |
| Marmon | Patschke | 74.1 |
| Stutz | Anderson | 74.0 |
| Delage | Knipper | 66.3 |
| Gray Fox | Wilcox | 63.8 |
| Braender Bull Dog | Chandler | Running at Finish |
| White | Shrunk | |
| Chalmers | Wetmore | |



Rickenbacher, in the Duesenberg, who won the Sioux City 300-mile race

SIOUX CITY, IA., July 4—The State of Iowa has made good today. Rickenbacher, driving an Iowa car, the Duesenberg, today won the 300-mile race on the Speedway at this city, averaging 78.6 miles per hour, and leading Spencer Wishart in a Mercer by the narrow margin of 48 seconds for the three centuries on the new 2-mile dirt oval, otherwise known as the Sioux City Speedway.

Although but seventeen of the twenty-two cars came to the starting line, today's race was one of the greatest interest, and until the 200-mile point was reached it was anybody's race. Rickenbacher, the winner, was not in the lead until at 180 miles, at which point the race had practically settled down, and it was apparent that the remaining 100 miles would be a duel between Rickenbacher and Wishart.

**Frequent Position Changes**

Rarely in a speedway race has there been such change of positions in the first 200 miles. Burman, driving a Peugeot, which Jules Goux piloted at the recent Indianapolis meet, jumped to the front at the opening of the race and held the lead until 33 miles, when Wishart put his Mercedes to the fore, and Rickenbacher was working up into third place. At 80 miles Wishart and Rickenbacher were practically tied for first place, and they ran neck-and-neck to the 100-mile post.

At 120 miles Tom Alley, driving another Duesenberg, was leading with Wishart second and Rickenbacher third.

At 140 miles there was another shift in position, Wishart taking the lead with Rickenbacher second and Alley third.

There was still another shift at 160 miles, when Knipper, driving the Thomas Delage which won at Indianapolis, was in first position with Patschke in the Marmon second, Rickenbacher third and Wishart fourth.

**Rickenbacher Takes Lead**

When 20 miles more were covered, there was still another shift, Rickenbacher getting into the lead. At 200 miles the Delage was disposed of through a cracked jacket, the Marmon was delayed by carbureter trouble, and Rickenbacher had a slight lead on Wishart.

Although seventeen cars started, seven actually finished the race, and three others running at that time were flagged off.

Today has been a sad one for the foreign cars, six of which were entered and handled by American pilots, and only one of which finished. The day's results are in strong contrast with May 30 at Indianapolis when foreigners carried off the four leading positions and America was content with fifth place.

Spencer Wishart, who finished second in the Mercer

In today's race of three Peugeots, two Sunbeams and the Thomas-Delage entry, only one, the Delage, finished. All of the others went out through mechanical troubles. Burman's Peugeot was out at 160 miles with broken crankcase, connecting-rod and piston. Stringer, in another Peugeot, was out at 172 miles with a broken connecting-rod. Mulford, driving the third Peugeot, was out at 30 miles with a broken oil tank. Both Sunbeams were out before the finish, Grant at 262 miles with a broken universal, and Babcock at 200 miles with water troubles.

Knipper, although in the lead at 160 miles, met his fate at 196 miles, when the jacket of No. 4 cylinder was

cracked and he had to stop every 10 miles thereafter to take on water.

But there were more upsets in favorites today than those that fell to the lot of the foreigners. Oldfield, the American hero at Indianapolis, was out at 146 miles, with a cracked cylinder. There were one or two local entries, notably the White and Chalmers, which had serious trouble early in the race, the White with bearings, and the Chalmers with valve and carbureter difficulties.

Duesenberg driven by Alley and Mulford, which took third place

The race started at 11 o'clock. There had been three cars which had failed to qualify by averaging 70 miles an hour—the two Chevrolets and the Moon. The Metropol was out with a broken crankshaft and the Stafford with a broken crankcase.

At the outset it looked as if the race would be a runaway for Burman in the Peugeot. He made his bid right at the outset. Being in the first row of starters he soon jumped away from Anderson and Mason and swung by the tape for the first time with a fairly comfortable lead. The second time around saw this increased to almost a half mile, for as he crossed the tape the closest to him was Anderson in the Stutz, who also had opened up on the others, leading Wishart by a few car lengths, while trailing were Mulford, Shrunk, Oldfield, Knipper, Patschke, Stringer, Mason, Grant, Wilcox, Babcock, Alley and Chandler, strung out for a mile. At this point Mason had to stop.

**Burman Takes Lead**

Burman, once out in front, settled down to a steady grind, while Wishart became runner-up, leading Mulford by about 100 yards. Anderson, Oldfield and Patschke were in the next group, while the others were well spread out, with Chandler bringing up the rear. Burman had the satisfaction of leading at the first 20-mile post, but Wishart had been sticking to his task and he was gradually eating up the distance that separated him from Burman. The Peugeot driver apparently was not getting as much speed out of his mount as he had at the outset. It was noted that there was a miss on the Peugeot that slowed it, and the Mercer took advantage of this and Wishart caught his man when Burman stopped in the thirty-second mile to change a tire and to make a carbureter adjustment.

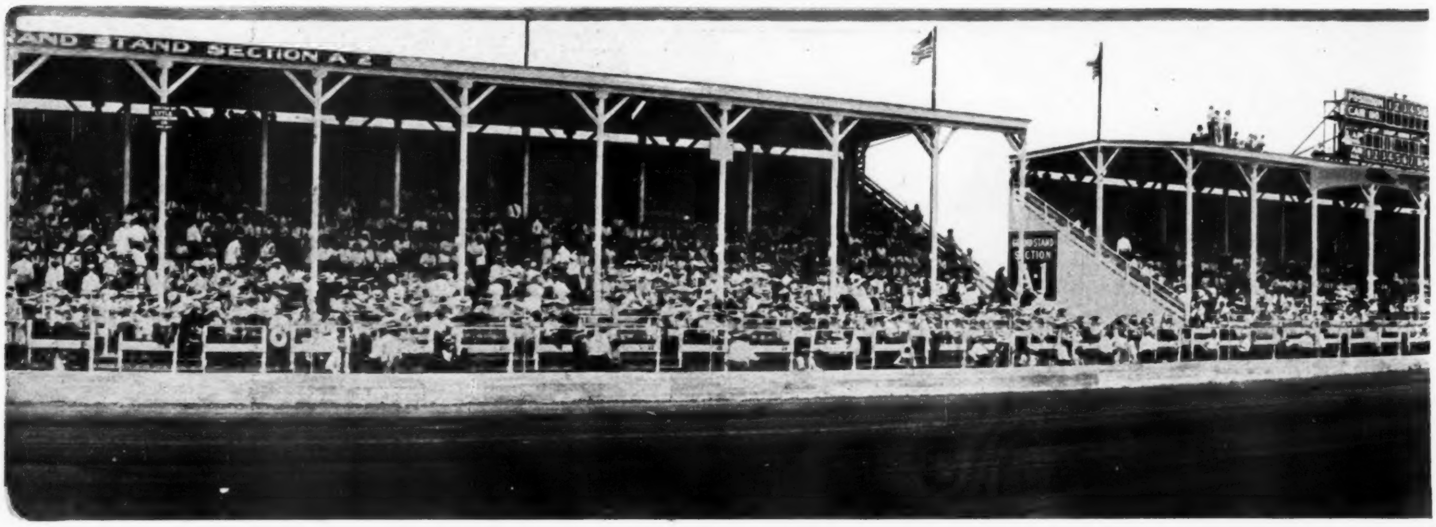
Wishart was the leader at 40 miles with Stringer runner-up and Rickenbacher in third place. Grant was fourth and Patschke fifth. The Mercer star also led at 60 miles, but Rickenbacher had gone to second and Anderson to third. There were only 17 seconds between first and second, however. At 80 miles Wishart and Rickenbacher were tied and Alley in the other Duesenberg was third, with Anderson fourth. The same order prevailed at 100 miles, with Wishart being just 1 second to the good.

Tom Alley, who has been Ralph DePalma's mechanic for several years and who was given his first chance as a driver when No. 12 Duesenberg was turned over to him, had the joy of leading this field at 120 miles, with Wishart second and Rickenbacher third. Wishart got to the front again, however, at 140 miles, with Rickenbacher still sticking to him and Alley back in third place. The next 20 miles, though, saw a general shaking up among the leaders. Knipper, in the Delage, who had been running fourth for 40 miles, went into the lead, with Patschke second, Rickenbacher third and Wishart fourth.

At 180 miles Rickenbacher climbed out in front, and

**Time for Each 20 Miles of the Sioux City 300-Mile Race**

| No. | Car | Driver | Miles: 20 Laps: 10 | 40 20 | 60 30 | 80 40 | 100 50 | 120 60 | 140 70 | 160 80 | 180 90 | 200 100 | 220 110 | 240 120 | 260 130 | 280 140 | 300 150 | M.P.H. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | Duesenberg | Rickenbacher | 15:59 | 31:34 | 46:58 | 1:02:36 | 1:18:19 | 1:34:03 | 1:49:40 | 2:06:43 | 2:21:48 | 2:36:40 | 3:00:00 | 3:02:28 | 3:18:45 | 3:33:47 | 3:49:02 | 78.6 |
| 19 | Mercer.... | Wishart.... | 15:22 | 31:09 | 46:41 | 1:02:36 | 1:18:18 | 1:33:49 | 1:49:20 | 2:07:35 | 2:23:09 | 2:38:35 | ....... | 3:04:30 | 3:19:38 | 3:36:19 | 3:49:50 | 78.0 |
| 12 | Duesenberg | Alley...... Mulford | 16:31 | 32:46 | 47:37 | 1:03:31 | 1:19:11 | 1:33:15 | 1:50:33 | 2:08:43 | 2:24:12 | 2:44:41 | 2:57:02 | 3:12:47 | 3:28:50 | 3:44:53 | 4:02:10 | 74.9 |
| 1 | Marmon... | Patschke... | 15:50 | 31:42 | 49:00 | 1:04:25 | 1:19:50 | 1:35:37 | 1:51:17 | 2:06:42 | 2:26:31 | 2:48:30 | ....... | 3:08:32 | 3:24:57 | 3:44:09 | 4:02:56 | 73.0 |
| 16 | Stutz..... | Anderson... | 16:19 | 32:48 | 47:33 | 1:03:44 | 1:19:40 | 1:35:36 | 1:51:41 | 2:07:30 | 2:25:40 | 2:47:11 | ....... | 3:13:19 | 3:29:37 | 3:45:49 | 4:03:34 | 74.6 |
| 22 | Delage.... | Knipper.... | 16:14 | 32:23 | 48:14 | 1:04:14 | 1:19:57 | 1:35:26 | 1:50:53 | 2:06:19 | 2:22:00 | ....... | 3:10:29 | 3:32:40 | 3:52:22 | 4:12:44 | 4:31:07 | 66.3 |
| 21 | Gray Fox.. | Wilcox..... | 16:23 | 32:19 | 48:10 | 1:05:35 | 1:21:18 | 1:51:52 | 2:07:46 | 2:23:56 | 2:45:12 | ....... | 3:20:19 | 3:37:08 | 3:59:32 | 4:21:24 | 4:42:32 | 63.8 |
| 26 | Braender.. | Chandler... | 17:11 | 34:19 | 51:25 | 1:09:03 | 2:12:19 | 2:21:12 | 3:20:46 | 3:37:58 | 3:54:48 | 4:48:14 | Finishe | d 126 la | ps. Tim | e 4:58.1 | 9 | |
| 2 | White..... | Shrunk..... | 16:19 | 36:13 | 52:59 | 1:13:48 | 1:30:23 | 3:30:29 | 3:55:16 | 4:17:17 | Ran 98 | laps. Ti | me 4:58 | .42 | | | | |
| 5 | Chalmers.. | Wetmore... | 18:22 | 39:07 | 1:03:08 | 2:05:59 | 2:34:05 | 3:28:07 | 4:13:06 | 4:39:23 | Ran 88 | laps. Ti | me 4:56 | .21 | | | | |
| 15 | Sunbeam.. | Grant...... | 19:25 | 36:00 | 52:32 | 1:09:13 | 1:25:49 | 1:42:30 | 1:59:06 | 2:17:17 | 2:33:06 | 2:44:37 | 3:00:00 | 3:17:03 | 3:33:51 | Out, 13 broken | 1 laps univers | al |
| 14 | Sunbeam.. | Babcock.... | 15:20 | 31:38 | 48:03 | 1:04:42 | 1:23:13 | 1:39:20 | 1:55:54 | 2:11:31 | 2:32:46 | 2:44:20 | Out, 10 | 8 laps, s | tripped | driving | pinion | |
| 17 | Stutz..... | Oldfield.... | 16:06 | 33:45 | 49:44 | 1:05:47 | 1:22:03 | 1:38:08 | 1:54:27 | Out, 74 | laps, br | oken cy | linder | | | | | |
| 6 | Peugeot... | Burman.... | 15:21 | 32:12 | 49:26 | 1:05:10 | 1:20:40 | 1:37:50 | 1:53:43 | Out, 80 | laps, br | oken co | nnectin | g-rod d | ue to bu | rned be | aring | |
| 7 | Peugeot... | Stringer.... | 16:27 | 31:18 | 52:43 | 1:09:11 | Out, 44 | laps, br | oken co | nnectin | g-rod | | | | | | | |
| 9 | Peugeot... | Mulford.... | 15:40 | Out, | 13 laps, | oil tank | broken | | | | | | | | | | | |
| 11 | Mason.... | Mason..... | Ran 3 | laps, b | roken d | riveshaf | t | | | | | | | | | | | |




The Sioux City Speedway before the start of the 300-mile race, held July 4, showing arrangement of the grandstands

once there he never relinquished his advantage. Knipper was back to second, but at 200 miles Wishart had ousted him, and from there on to the end it was a duel between the Rickenbacher-Duesenberg and the Wishart-Mercer. The two pulled away from their rivals and each was waiting for something to happen to the other fellow. Rickenbacher's knowledge of the track, where he has raced for the last 2 years, stood him in great stead and the way he took the turns picked up many seconds for him. Both men were in the same lap when Starter Fred Wagner took his collection of flags across the track. Rickenbacher got the checkered bunting first, then had to go two more laps to play safe on the scoring.

**Duesenberg Gets Third**

With the two leaders out of the way, the balance of the field settled down to fight for the rest of the prize money. No. 12 Duesenberg, the Anderson-Stutz and the Patschke-Marmon were running so closely that any one of them might have landed third, but the Duesenberg was the one to gain the position, and back of it were the Stutz and Marmon in the order named. Then there was a long wait until Knipper and Wilcox could finish. They were far in the rear and back of them were the White and the Chalmers, all striving to finish because there were ten prizes. The officials waited on Knipper and Wilcox, but the other three were so far behind that in kindness to both the drivers and the spectators the officials flagged them.

The ten prizes were awarded as follows: Rickenbacher, $10,000; Wishart, $5,000; Alley-Mulford, $2,500; Patschke, $1,750; Anderson, $1,500; Knipper, $1,100; Wilcox, $900; Chandler, $800; Shrunk, $750; Wetmore, $700.

That Rickenbacher should have won this gruelling grind is not surprising when one reviews his record. He has driven in more races on the Sioux City track than any other man; he has broken several records there, including the 50-mile mark; he had a car that is surprisingly fast and built for just this sort of work, while his knowledge of the speedway gave him a great advantage. In addition, Rickenbacher had comparatively little trouble, making only two stops in the 300 miles. His first one was at 144 miles when he lost 35 seconds changing a tire; again at 254 miles he stopped at the pits.

While there were no accidents during the race, still there were several drivers injured by being struck by flying clods of dirt. It seems to be a peculiarity of this track, and Referee Kneedler, realizing it, forced every pilot to equip his car with a wire screen, placed at the steering wheel.

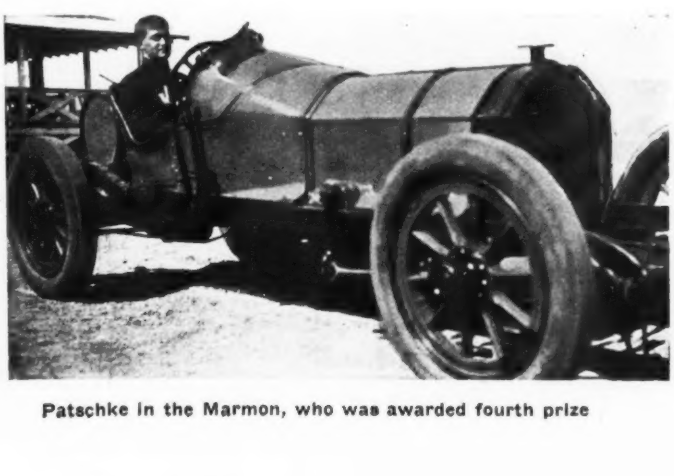
The two Duesenbergs that came in first and third have 4.4 by 6-inch motors, the piston displacement being 360.5 cubic inches. The wheelbase is 106 inches. Rudge-Whitworth wire wheels with Riverside tires were used. Thirty-three by 4.5-inch tires were used on the front and 35 by 5 on the rear. Ignition was supplied by a Bosch and the spark plugs were K. L. Gs. The carbureter was a Schebler and the gear ratio is 2.6 to 1. Oilzum oil was used.

The car to finish second, which was Spencer Wishart's Mercer, was equipped with a 4.8 by 6.2-inch motor having a displacement of 445 cubic inches. Both magneto and plugs were Bosch made and a Rayfield carbureter was fitted. The wheelbase is 112 inches, the gear ratio 2.5 to 1. Rudge-Whitworth wheels with Palmer tires, 35 by 5 inches all around were employed. Castor oil was used for lubrication.

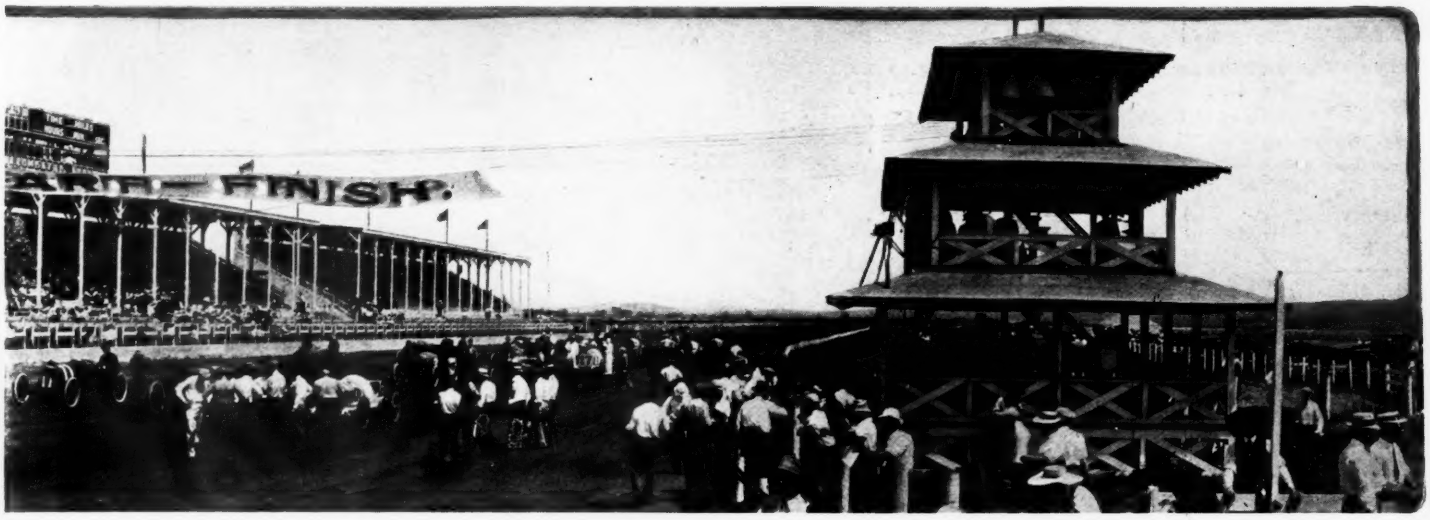
Complete specifications of all the cars will be found on page 104.

The track, though, stood up wonderfully. It had been predicted that it would be cut to pieces before 200 miles, but outside of a few rough spots on the turns it looked as good at the finish as it did at the start. It had been so well oiled that there was no dust and the speed of the big oval was shown by the fact that Rickenbacher averaged 78.6 miles per hour for the 300 miles.

So encouraged are they by the results of their efforts that they have decided to have a real speedway before another year is past. They propose to either resurface the present track or let the present gumbo stay and bank the turns so they will permit of greater speed. To get the flyers they intend hanging up a $50,000 purse and to retain the same day they had this year—the national holiday. At the present time they are handicapped by lack of really good transportation between the City of Sioux City and the track, which is located just over the state line in Union County, S. D.



Patschke in the Marmon, who was awarded fourth prize




at the start and finish line. The officials propose to resurface the present track and to hang up a $50,000 purse for 1915

# Right Rear Tires Most Trouble

SIOUX CITY, IA., July 4—If right rear tires could have been eliminated from today's race the winning pace of 78.6 miles per hour would have been considerably exceeded. Every car that changed a tire changed the right rear, and five of the drivers had to change two right rears.

Next to tire troubles there came many examples of general breaking of car parts, which seemed to prove that after a racing car has been through two or three gruelling tests it must be rebuilt to give satisfaction. For example, Knipper, driving the winning Delage from Indianapolis, cracked a waterjacket after he had driven 200 miles. Oldfield, driving a Stutz, was out with a cracked cylinder at 144 miles. Burman, in one of the Indianapolis Peugeots was out at 160 miles with a broken crankcase, connecting-rod and piston, undoubtedly due to the seizing of a bearing. Stringer, driving another Peugeot, broke a connecting-rod at 172 miles. Mulford, in a third Peugeot, was out at less than 30 miles with a broken oil tank and other oiling trouble. Grant's Sunbeam, which behaved so admirably at Indianapolis, was out at 262 miles with a broken universal. One of the Masons broke a drive-shaft at 4 miles, and Babcock, driving the other Sunbeam, had a hose connection burst at 200 miles.

Many of these troubles can be traced directly to the severe punishment that the cars have previously received.

Rickenbacher made two stops during the race with a total loss of time of 1 minute and 3 seconds. He changed the right rear at 144 miles, doing the work in 35 seconds, and at 254 miles he stopped for gasoline and oil, consuming 28 seconds in taking these on. Spencer Wishart made three stops with his Mercer. At 150 miles he took on gasoline and oil in 40 seconds; at 196 miles he took 8 minutes changing a broken valve spring and at 260 miles he blew a right rear and took 50 seconds for the replacement.


Gil Anderson in the Stutz, which finished fifth

Tom Alley, who brought No. 12 Duesenberg into third place, had a narrow escape from severe injury when he made his first stop at the end of the 78th lap. The car was filled with water and oil and as soon as the pit man started to fill the tank with gasoline the car caught fire and a merry blaze continued for about 15 seconds and was extinguished with three Pyrene extinguishers.

While Mulford held the wheel he made but one stop, at 208 miles, for oil and water and to change a right rear tire which had blown out.

**Short Stops at Pits**

Anderson stopped twice during the race, having a total delay of 3 minutes and 9 seconds. First he took on gasoline and oil and at 224 miles changed the right rear, and replenished with gasoline. He had no mechanical troubles.

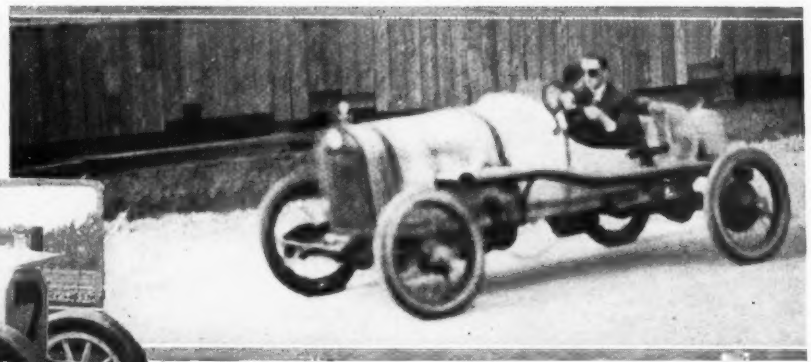
Patschke had a total loss of 4 minutes at the pits with his Marmon, having to make four stops. At 12 miles he took on gasoline and oil. At 178 he changed a right rear. At 256 he stopped for carbureter adjustment and to take on water, and at 294 miles he was compelled to stop again for water.

Knipper, driving the Delage which won the Indianapolis race, had eleven stops, totaling 19 minutes and 15 seconds. His trouble started at 198 miles, when No. 4 cylinder cracked, allowing the water to run out. He decided to continue and stop frequently to add water. After changing the right rear tire and changing a spark plug in No. 4 cylinder, he was started after a delay of 10 minutes. He stopped for water at 214, 222, 232, 242, 252, 260, 268, 270 and 280 miles.

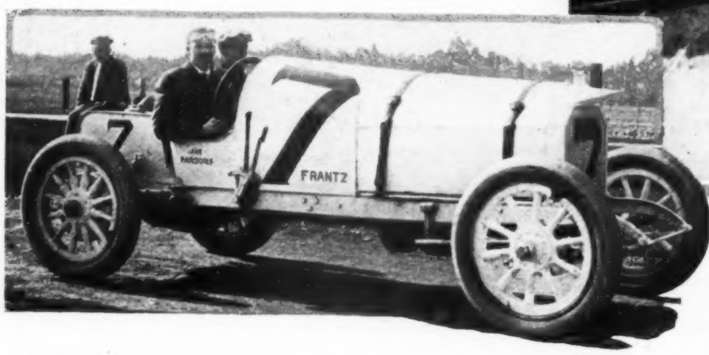
Wilcox drove the Gray Fox the last 10 miles without oil, doing this to finish in seventh place, although he had sufficient leeway to finish seventh and stop for oil. His first stop was made at 100 miles for oil and water; his second was at 116 miles for gasoline, oil and water. He made a long stop a few laps later to change 3 valves and later had push-rod trouble, causing 3 delays at the pits. A push-rod broke at 238 miles, and there was more valve trouble at 260 miles.

Five stops had to be made by Chandler in the Braender Bull Dog, the total time being 1 hour 39 minutes 3 seconds. The longest was at 80 miles, when the oil line broke, and after being repaired it gave much trouble, necessitating stops at 100, 122 and 130 miles. At each of these the line was

(*Continued on page* 104)



Right—Klein in King car going past Tacoma grandstand at 90 miles an hour




Left—Jim Parsons' Frantz, 100-mile winner

# Stutz and Maxwell Star at Tacoma

## Former Wins 250 and Latter 200-Mile Event—100-Mile Race Won by Frantz Special

TACOMA, WASH., July 4—*Special Telegram*—The 2-day racing on the 2-mile Tacoma Speedway yesterday and to-day evolved three popular winners in the three races scheduled for the Montamara speed carnival, Cooper in a Stutz winning the 250-mile event, Hughes in a Maxwell the 200-mile one, and Parsons in a Frantz the 100-mile race.

Earl Cooper, driving a Stutz, won the 250-mile race to-day for the Montamarathon trophy, averaging 73.44 miles per hour and defeating his nearest challenger Ruckstall, in a Mercer, by 12 miles. Cooper's time was 3:24:34 4-5 seconds. There were five other finishers, the Ruckstall Mercer, second, averaging 70.57 miles per hour. Klein, driving the King, third, averaging 69.89; Parsons, driving the Frantz, with an average of 66.57; and Taylor in an Alco, fifth, averaging 64.8. Nine other cars started, making a total of fourteen, and of these only one was running at the finish, this being the Hupmobile, which was flagged off when the race was called.

**Cooper Breaks Records**

Cooper, the meteor of the speed constellation who in 1913 won the American championship through his consistent driving on the coast, never before shone so brightly as he did to-day in the race for the Montamarathon trophy. Lying back he shot the Stutz to the front after covering 84 miles and was never headed thereafter. His victory was decisive.

With Cooper so far in front, interest in the race centered in the battle for second place between Ruckstall, the Mercer pilot; Klein, the King driver; and Dingley, at the wheel of the Ono. Until Dingley's car was wrecked at 248 miles he had a slight advantage on the other two contenders as he was leading them by half a lap. With the Ono eliminated, the fight for second money narrowed down to a last lap spurt between the Mercer and King, and the Mercer got the decision by 2 minutes.

Six cars that were nominated failed to appear when the field was sent away at 2 o'clock—the Romano, Chalmers, P. C. Special, Hudson, Italia and de Alene's Marmon. With the exception of the Marmon, which was wrecked in the Potlatch race of yesterday, no reason was given for the withdrawal of these entries.

**Maxwells Dangerous Contenders**

Seven of the starters suffered mechanical trouble. All three Maxwells were eliminated before Cooper got the checkered flag, although two of them were in dangerous positions for the greater part of the race. Hughes, one of the Maxwell team, was overcome with the heat and was relieved by Carlson who completed 103 laps before he was forced to withdraw his mount with a broken valve spring. Tetzlaff's Maxwell was a contender for 90 laps when it suffered a broken steering gear. Teddy crawled up to the pits with his mechanician, Benedict, astride the hood and holding the parts together.

Brock's Ray also looked dangerous and showed a world of speed until it was eliminated on the eighty-fourth lap with a broken frame. The two Fiats, driven by Verbeck and Sorrell, were the first to give up the chase, Sorrell driving but three laps and Verbeck withdrawing after making thirteen circuits of the course.

**Intercity Trophy Race 100 Miles**

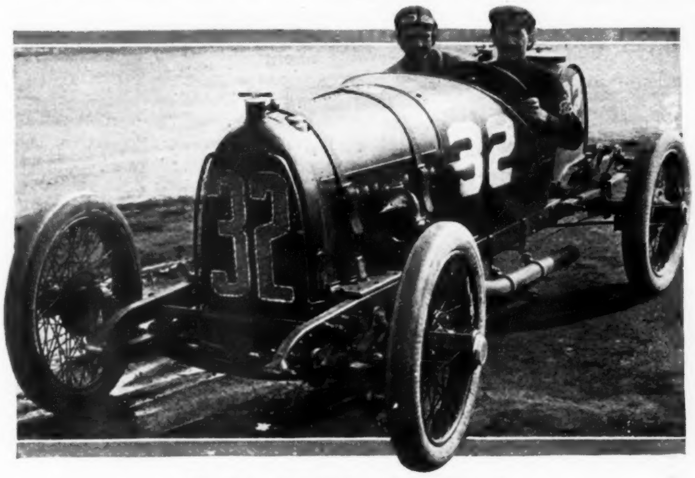
| Position | Car | Driver | Time | M.P.H. |
|---|---|---|---|---|
| 1 | Frantz, | Parsons ....... | 1:21:29 2-5 | 73.6 |
| 2 | Ray, | Brock ......... | 1:31:22 2-5 | 65.72 |
| 3 | Lozier, | Latta ......... | 1:32:33 1-5 | 64 8 |
| 4 | Studebaker, | Staley ........ | 1:39:37 2-5 | 60.23 |
| 5 | Chevrolet, | Croston ....... | ——— | —— |
| 6 | Hupmobile, | Smyley ....... | ——— | —— |
| | Mercer, | Thomas, out on 34th lap with burned-out bearing. | | |
| | Romano, | Barnes, out on 31st lap with broken air line. | | |
| | P. C. Special, | Terrien, out on 13th lap, engine trouble. | | |
| | Hudson, | Schneider, out on 9th lap with broken crankcase. | | |
| | National, | McGoldrick, out on 7th lap with burned-out clutch. | | |

**Potlatch Trophy Race 200 Miles**

| Position | Car | Driver | Time | M.P.H. |
|---|---|---|---|---|
| 1 | Maxwell, | Hughes ....... | 2:41:32 2-5 | 74.28 |
| 2 | King, | Klein ......... | 2:41:36 4-5 | 74.25 |
| 3 | Stutz, | Cooper ....... | 2:44:01 2-5 | 73.26 |
| 4 | Ono, | Dingley ....... | 2:50:13 3-5 | 71.81 |
| 5 | Mercer, | Ruckstall ..... | ——— | —— |
| 6 | Frantz, | Parsons ....... | ——— | —— |
| | Marmon, | DeAlene, out on 73rd lap, car wrecked | | |
| | Chalmers, | Kennedy, out on 33rd lap with broken spring hanger. | | |
| | Mercer, | Pullen, out on 24th lap with broken rear axle shaft. | | |
| | Maxwell, | Tetzlaff, out on 17th lap with broken valve spring. | | |
| | Ray, | Brock, out on 11th lap with bent rear axle. | | |
| | Maxwell, | Carlson, out, engine trouble. | | |
| | Fiat, | Verbeck, out, engine trouble. | | |
| | Italia, | Welch, out with two cracked cylinders. | | |

Yesterday, the festival opened with two curtain-raiser events, one at 100 miles for cars of 450 cubic inches and under, in what was known as the Inter-City Century. This was won by Parsons driving a Frantz, who drove the Century in 1 hour, 21 minutes, 29 2-5 seconds, averaging 73.6 miles per hour for the distance. By his victory Parsons repeated his triumph of last year and got permanent possession of the Perpetual Challenge Trophy presented by the Tacoma Automobile Club, as well as $750 in cash.

In this race there were eleven starters, four of which finished the distance, two others were running at the finish, and five withdrew for mechanical troubles during the race.



Hughes at wheel of his Maxwell

Brock, in the Ray, was second, almost 10 minutes behind the victor. Latta, driving a Lozier 100 miles without a single stop for tires or fuel, was a close third. Staley, in a Studebaker, was fourth, and Croston's Chevrolet was fifth. The Chevrolet also completed the entire century without a stop. The only other car to finish was Smyley's Hupmobile, which took sixth money.

The Intercity race was a battle between Parsons and Brock which reached its height in the last 40 miles. Near the finish the Ray suffered from rear axle trouble.

### Hughes Wins Potlatch

The major event on yesterday's program was for the Golden Potlatch trophy for cars not exceeding 600 cubic inches, the distance being 200 miles. Hughey Hughes in a Maxwell was winner, after a sensational struggle with Arthur Klein in the King, and finally won by the scant margin of 4 2-5 seconds. Hughes' time was 2 hours 41 minutes 32 2-5 seconds, and Kleins' time 2 hours 41 minutes 36 4-5 seconds.

## Montamarathon Trophy Race 250 Miles

| Position | Car | Driver | Time | M.P.H. |
|---|---|---|---|---|
| 1 | Stutz, | Cooper ....... | 3:24:34 4-5 | 73.44 |
| 2 | Mercer, | Ruckstall ..... | 3:32:33 4-5 | 70.57 |
| 3 | King, | Klein ........ | 3:34:22 1-5 | 69.89 |
| 4 | Frantz, | Parsons ...... | 3:45:20 1-5 | 66.57 |
| 5 | Alco, | Taylor ....... | 4:17:12 | 64.8 |
| | Hupmobile, | Smyley, running when race was called. | | |
| | Ono, | Dingley, out on 124th lap when car overturned. | | |
| | Maxwell, | Hughes-Carlson, out on 103rd lap with broken valve spring. | | |
| | Maxwell, | Tetzlaff, out on 90th lap with broken steering gear. | | |
| | Ray, | Brock, out on 84th lap with broken frame. | | |
| | Mercer, | Pullen, out on 27th lap with broken axle shaft. | | |
| | Fiat, | Verbeck, withdrew after completing 13 laps. | | |
| | Fiat, | Sorrell, out on 3rd lap with broken air line. | | |
| | Maxwell, | Carlson, out, engine trouble. | | |

Hughes averaged 74.28 miles per hour. By his victory Hughes gets possession of the Challenge Trophy and $1500.

Hughes took the race by a garrison finish. The triumphant Maxwell shattered Earl Cooper's record of 71.07 miles an hour established in the 1913 event.

At the finish, Cooper was almost as close to Klein as the King driver was to Hughes and was a close third. Dingley's Ono was fourth, Ruckstall's Mercer fifth and Parsons' Frantz sixth.

Until it was eliminated on the seventy-third lap, de Alene's Marmon was showing the way to the field. It went to the front at the end of the twenty-third lap and was in front for 100 miles, having an advantage of two laps when it blew a tire and rolled over in the ditch. Cooper then assumed the role of pacemaker and was not overtaken until the ninety-eighth lap when Hughes thundered by the Stutz. On the ninety-ninth lap, seconds only separated the Maxwell, Stutz and King. When almost on top of Hughes, Cooper blew a rear tire and this misfortune gave the Maxwell the race and the King second money.

Ed. Pullen, winner of the 1914 grand prize, failed to finish, but to him go the honors for driving the fastest lap. Pullen sent the Mercer around the 2-mile course in 1 minute 22 2-5 seconds, an average speed of 87 miles per hour.

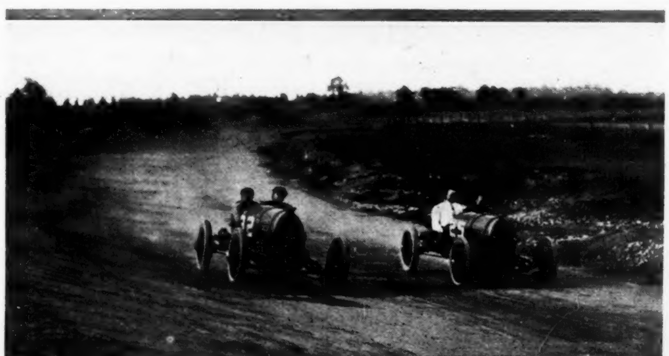
### 35,000 People at the Races

Speed fans of the northwest turned out in throngs to witness the races. Twenty thousand people were attracted to the speedway yesterday and the holiday crowd that packed the stands today numbered 35,000.

Two accidents marred the 2 days of exciting sport. In today's race, Bert Dingley at the wheel of the Ono and his mechanician, Swanson, were injured when on the next to the last lap, the car plunged from the course and threw its occupants 60 feet before overturning in a ditch. Both were severely injured and it was announced tonight that Dingley is not expected to survive.

In the Potlatch trophy event of yesterday, de Alene, the Marmon driver, and his helper, Scanlon, were hurt.

Parsons pushing his Frantz



A brush between Hughes and Carlson in Maxwells

# Development of Automobile Trade Abroad

## Good Sale for Low-Priced Cars—Latest Consular Report Gives Suggestions to Exporters—Our Cars Popular

THE Department of Commerce and Labor has issued the third special consular report in the form of a supplement to that issued last year and which appeared in THE AUTOMOBILE for May 1. The first of these publications appeared in this magazine in August 22, 1912.

American exporters of automobiles have made an excellent start in many foreign markets and as a rule occupy a good position wherever there is an extensive sale of cars.

Fourteen consuls general, comprising the local supervising officers in the district of Europe, covering all of Europe except European Russia, the Balkan States, and Greece, have rendered to the U. S. headquarters a series of statements showing what has been done in their respective countries to extend the American export trade in automobiles.

These reports are of great interest as they give exceptional value to the American manufacturer who wishes to obtain accurate information relative to the conditions of trade and other requirements of contemplated fields for the exploitation of his product.

### Cyclecar in United Kingdom

In the United Kingdom, one of the chief foreign markets for low-priced American automobiles, the most prominent feature of the trade at present is the development of the cyclecar, which is considered an important competitor of the less expensive automobile. It is shown that Europeans in general will buy low-priced cars if the cars are properly exploited, regardless of local conditions. It is essential that the exporter show a real economy in operation of his car, because of the higher price of gasoline in Europe. Attention to this item has already yielded large results to the Americans who are now putting large numbers of cars on the Continent.

There is a wide sale of American cars in England. The excellence of the construction of the American car has been widely and generously acknowledged. While there are some British cars selling at about the same or even slightly lower prices, the introduction of the low-priced car was due to American initiative, and American manufacturers have not spared expense in judicious advertising and in demonstrating the real value of their product. As a result, the low-priced British cars are not as widely known as those of American manufacture.

It is characteristic of the English buyer to purchase an automobile which he expects to use for a long time, so that durability is one of the considerations that influence him most strongly. The slightest deterioration in the quality of a single American make which is sold to any extent abroad will not only affect the particular manufacturer disastrously but will cause definite injury to the prestige of all American manufacturers selling automobiles in foreign countries.

There is only one point that the American car lacks and that is finish. There are a large number of English automobilists who are willing to make an additional outlay of $100 to $250 for an American car if they can obtain a car that satisfies their requirements in the way of finish. Such purchasers are now either buying British cars, at an extra cost of perhaps 25 to 50 per cent., or else are adapting a British body to an American chassis.

### British Make 200 Types of Machines

The sixty firms in Great Britain manufacturing automobiles offer to the public nearly 200 types of machines. The total output is now probably well over 20,000, although exact figures are not easily obtainable. It is calculated that two-thirds of the home demand is supplied by the British automobile manufacturers. German and Italian cars are increasing their hold in England, but French imports have dropped almost $2,500,000 in the last 4 years.

Official records show that in November, 1912, there were registered in France 76,771 automobiles, an increase of 12,562 since the same date in 1911. The value of the automobiles imported into France from this country in 1911 and 1912 was respectively $416,687 and $871,685.

According to official statistics, the value of the automobiles imported into France from the rest of the world in the 3 years, 1909, 1910 and 1911, was respectively $1,453,483, $1,677,556 and $2,235,230. In 1912 the imports amounted to $2,738,035. The increase in 1911 was due almost wholly to the increased popularity of the moderate-priced American car.

### Belgium Makes Many Bodies

It is estimated that there are more than 17,000 automobiles in use in Belgium. There are now twenty automobile factories in this country. This country does not seem to offer a very profitable field for the American manufacturer. The manufacture of automobile bodywork is an important industry in Belgium. The total annual production of the country is in the neighborhood of 3,650 cars, valued at nearly $6,176,000.

### Spain Buys Small Cars

In this country cars of European manufacture, of 15 to 20 horsepower, Spanish rating, with closed bodies holding four people, and costing from $3,000 to $6,000 seem to be most in demand. There is at present absolutely no demand for medium or high-priced cars of American manufacture. There is a certain prejudice in the Spanish mind against being known as the owner of a cheap car, although the sale of American cars of this class is increasing rapidly.

One of the causes for the small market in cheap American cars is the big profit exacted by the local agent from purchasers which brings the selling price to almost double that asked by the agent in the United States.

Although France dominates the Spanish market the U. S. is becoming a keen competitor. As showing that there is a better market in Spain for the lower-priced automobile the import figures for the years 1910 and 1911 provide an interesting contrast. In the first of these years the total number of cars exported was 393 at a value of $739,230. For the following year the number of cars reached 612, but the actual value represented a decrease, the figure being $565,422. Imports from France into Spain during 1911 totalled $392,973, while those from the United States represented $68,723. The figures for 1912 are not yet available.

### Russia Is a Growing Market

The Russian market for automobiles is increasing more rapidly than any other country in Europe for the reason that it has been backward up until very recent years and now there is a real demand for automobiles of all classes, particularly of the cheap but strong car.

There is a good market for American cars. Many American manufacturers have already arranged for agencies in the principal cities and are breaking down the prejudice that has existed against American cars for a number of years.

### Italy Importing More American Cars

The first 11 months of 1912 showed continued increases in the sales in Naples of low-priced, well-made American automobiles of a good appearance. There are fifteen automobile manufacturers in this country with a total output in 1911 of nearly 5,000 pleasure automobiles and trucks. Although the 1912 output is not completed, from information recently gathered, it would appear that the output will show figures reaching at least 8,000 machines. For the 11 months ending November 30, 1912, there were imported into Italy 227 automobiles of American manufacture, as against 145 for the calendar year 1911, only 25 in 1910, and 7 in 1909. The American cars imported are practically all of the cheaper grades.

### Argentina Buying Cars Fast

There have been 10,000 automobiles imported into Argentina since 1900. Demand has created supply, and today every class of automobiles can be obtained for hire. Eighty per cent. of the

imports of automobiles for the first 5 years were of French manufacture. In 1911 the value of the American imports into this country were valued at $330,126. During the first 9 months of 1912 no less than 3,067 cars were imported, valued at $3,575,740. The U. S. imports during that period amounted to $392,917.

**India**

The increase of 37 per cent. in the importation of automobiles into India is one of the interesting features of the trade returns for the official year ended March 31, 1912. Bombay continues to be the principal port of entry; of the year's imports, amounting to $3,255,785, cars to the value of $1,668,099 were received here. The value of the imports from the United States were valued at $195,925, four times the amount of 1910-11. It puts the United States in the second place and shows that our manufacturers are taking a serious interest in the Indian market. Returns covering the 6 months April to September, 1912, show automobile imports amounting to $1,305,111, as against $980,111 for the corresponding period of 1911. While it is acknowledged that American manufacturers are able to sell low-priced cars of good quality in every detail of construction, the Bombay buying public is inclined to think that the American is not yet able to compete with the European manufacturer in the highest-grade models. It is claimed that if American agencies in high-grade cars were established, many sales could be made. The American car sold at prices up to $2,000 has won its way absolutely on its merits and with the assistance of very little advertising.

**Prices of Various Foreign Cars**

The following list shows the prices of various less expensive cars of Continental and British make with which American cars have to compete:

| Description of Car | Horse-power | Price |
|---|---|---|
| AUSTRIAN | | |
| Four cylinders, interior-driven coupé, bore 80 mm. (3.1 inches), stroke, 110 mm. (4.33 inches), four-speed gears | 16-18 | $2,798 |
| GERMAN | | |
| Four-cylinder, inclosed valves, leather clutch, four speeds and reverse, bevel drive, chassis only | 12-20 | 1,582 |
| | 15-25 | 2,190 |
| Four cylinders, engines en bloc, inclosed valves, chassis inswept in front and upswept at back, fitted with long springs, chassis only | 5-12 | 973 |
| Same, with torpedo double phaeton | 6-16 | 1,460 |
| Same, limousine or landaulet | 8-20 | 2,190 |
| Four cylinders, engine 75 by 88, thermo - siphon cooling, four speeds and reverse, forced-feed lubrication by pump, multiple-disk clutch, tires 750 by 88 mm. (29.5 by 3.5 inches), chassis | 10-16 | 1,073 |
| FRENCH | | |
| Torpedo two-seater, four speeds, with hood and screen | 8 | 1,022 |
| Same, with interior-driven coupé | 8 | 1,192 |
| Four cylinders, four speeds, worm drive, two-seater, torpedo body. | 11 | 1,679 |
| Same, chassis only | 11 | 1,294 |
| Complete torpedo body or two-seater with dickey seat behind, four speeds, hood and screen | 11 | 1,460 |
| | 14 | 1,752 |
| Same, with standard body | 16 | 1,874 |
| Same, with five seats | 16 | 1,995 |
| Four cylinders, four-seater torpedo, with hood, screen, all lamps, horn, etc. | 12 | 1,606 |
| Four cylinders, engine 65 mm. (2.5 inches) bore, trough lubrication, high-tension magneto, thermo-siphon, cylinders cast in one, chassis price | 8-10 | 1,216 |
| ITALIAN | | |
| Polished chassis, mono-bloc engine, four speeds | 15-20 | 1,776 |
| Four cylinders, Captain fixed wire wheels with detachable rims, dynamo electric installation, auxiliary engine-starting magneto, horn and speedometer, chassis complete | 30 | 2,677 |
| BRITISH | | |
| Two-seater, bore and stroke of engine 69 and 130 mm. (2.7 and 5.1 inches), with hood, wind screen, lamps and horn | 10-12 | 1,095 |
| Same, four-seater | 10-12 | 1,240 |
| Four cylinders, bore and stroke 80 and 140 mm. (3.1 and 5.5 inches), 9-foot wheel base, four speeds forward and reverse, four-seater, worm or bevel drive, with hood, screen, etc. | 16 | 1,703 |
| Four-seater, torpedo model, complete | 14 | 1,124 |
| Two-seater, complete | 10 | 894 |
| Four cylinders, victoria two-seater, hoods, screen, lamps, etc. | 12-14 | 1,168 |
| Four cylinders, five-seater torpedo phaeton, with hood, screen, lamps, etc. | 16-20 | 1,411 |
| Two-seater torpedo body, two cylinders, cape cart hood, wind screen, engine 85 by 85 mm. (3.3 by 3.3 inches), chain drive, two speeds, Dunlop tires | 8 | 803 |
| Four cylinders, four-seater, complete with Dunlop tires | 12 | 1,387 |
| Four cylinders, two-seater, car complete | 20 | 730 |
| Two cylinders, safety three-wheeler, two-seated torpedo | 10-14 | 584 |
| Four cylinders, chassis with tires. | 10 | 706 |
| | 13-16 | 1,022 |
| Two-cylinder victoria seating three abreast, engine 102 by 115 mm. (4 by 4.5 inches), cylinders cast en bloc, Dunlop tires, with hood, screen, lamps, etc. | 13 | 1,071 |
| Four cylinders, torpedo two-seater. | 12 | 1,095 |
| Same, four-seater | 12 | 1,183 |
| Two cylinders, two-seated victoria, V-type engine, 85 by 88 mm. (3.3 by 3.4 inches), three speeds, worm drive, complete car | 7-8 | 633 |
| Four cylinders, four-seated double phaeton torpedo, with hood, screen, etc., spare tire and wheel. | 11 | 1,509 |

# Oldfield Bill Again Menaces Inventors

*By Gilbert H. Montague*

The revised Oldfield bill, House of Representatives 15,989, which was introduced on April 24, 1914, and the hearings on which are now in progress before the House Committee on Patents, of which Mr. Oldfield is chairman, follows closely on the original Oldfield Bill of 2 years ago, in that it virtually abolishes license restrictions by providing that no action for infringement may be brought for their violation, and cuts down, from 17 to 3 years, the patentee's absolute control over his patent, by providing that if after 3 years the patented invention is not put into use, the patentee may be compelled to grant a license to anyone applying therefor.

This bill proposes to deprive the patent owner of the right to sue pirating dealers and manufacturers as contributory infringers and to relegate the patent owner to separate actions for breach of contract against an army of small users whom these pirates instigate to break their agreements. This proposal leaves the patent owner virtually without remedy. Even if a thousand such suits were successfully prosecuted the damages would be small in each, uncollectible in most and less than the expense of litigation in all. Meanwhile, the patent owner would be practically helpless before the instigator.

The opponents of this bill declare that no aid which the existing law gives to the merchandising of patented articles can be called unfair. It has been shown repeatedly that the difficulties of merchandising are enormously increased in the instance of novelties. All patented articles are novelties at first and most of them continue to be novelties to most of the public until the 17-year patent period has expired. Considering the natural handicap thus imposed on the selling of patented articles, and the further fact that the patent owner must reap the benefit before the expiration of the 17-year period no aid which the existing law lends can be called unfair.

By the same token license restrictions agreed to by owners when they obtain patented articles, solely upon the condition that they use them only with supplies that are specially prepared for them, is to be countenanced. Mr. H. Ward Leonard, of the Ward Leonard Company, Bronxville, N. Y., maker of electrical apparatus for automobiles, says in this connection: "It certainly is a fact that in some instances a man's market for a good article would be completely destroyed if he could not insure himself in seeing that it was properly used after it left his hands."

The notion that such license restrictions might give patent owners a practical monopoly of the market for unpatentable products used with a patented device, is disposed of by the fact that such a practical monopoly, far from offending the public policy actually promotes the general welfare because the patent owners can attain it only by cheapening the cost of manufacture of the patented article and can continue only so long as their invention is not superseded by subsequent inventions, still further cheapening the cost of manufacture.

Some amendments in the patent law are certainly needed. Few will disagree that some legislation other than that proposed in the Oldfield bill is required. Changes should be made in the equipment and organization of the Patent Office to increase its efficiency and to secure for the public and inventors, whom it serves, the best possible service. By changes of this sort, rather than by the radical innovations proposed in the Oldfield bill, will the patent system of the United States be improved.

# Makers Save by Using S. A. E. Standards

## Opinions from Representative Makers Indicate That Economy of Time in Design and Manufacture and in Cost of Material Are Salient Features

ECONOMY in every branch of the industry is the direct result of the use of the standards that have been set by the S. A. E., is the consensus of opinion according to the various representative manufacturers. First of all there has been a cash saving in the purchase of raw material because the steel mills make comparatively few steels according to the S. A. E. specifications where heretofore the demands of each individual manufacturer had to be satisfied. A saving in time of delivery has also been effected here, as it is quicker to get a standard article than a special one. Less misunderstanding, fewer mistakes and economy of time in ordering the material have also resulted.

In the drafting room, a great deal of time has also been saved, as now in designing many small parts the draftsman merely refers to the S. A. E. handbook. Reduction in the stock of repair parts is another result as the same size of yoke ends are often used on several models.

Economy in time and trouble to the owner has also been effected. For instance, a spark plug can be purchased at any supply store. But if it were not for the standardization of this part, it probably would be necessary to send to the factory for it.

Expressions of opinion as to the value of the work the S. A. E. Standards Committee has done are given below.

#### Wheel Rims Most Important

"We have followed very closely the work of the Standards committee of the Society of Automobile Engineers and this work has been of great value to our company. If there is any one thing that is more valuable than the others, it is, perhaps, the standardization of truck wheel rims. The writer would consider this to be of great value to the wheel builder, tire maker, manufacturer of trucks, as well as the user. It is not necessary for the wheel builder to carry special stock for each different order of wheels; it is not necessary for the truck manufacturer to carry special wheels for different makes of tires and the customer can very easily purchase any type of tire that he might fancy and be assured that it would properly fit the wheels on his truck.

"The standardization of carbureter fittings, magneto bases, brake clevises, etc., are of very great value to the manufacturer as well, and we feel that the work of the Standardization committee has been of great value and should be carried out farther."—C. B. Rose, Chief Engineer, Velie Motor Vehicle Co.

#### Advantage Is Unquestioned

"The advantage of the automobile industry of the standardization of parts, as worked out by the S. A. E., can hardly be questioned. It is equivalent to having a large force of the best engineers in the country working out details in your factory. This advantage begins first with the designing engineer and saves him considerable annoyance and time. In the drafting room it saves a number of special drawings and the time required in working out these details. As making parts in large quantities cheapens production, the purchasing department finds that it is much easier and cheaper to buy parts which have been standardized by the Society of Automobile Engineers.

"Also time of delivery is very materially shortened, which often prevents costly and wasteful delays. In the machine shop standard tools can be used for making these parts. This materially reduces the tool room force. There is a saving on the assembling and erecting floors, as standardization has a tendency to reduce a large number of small parts of different types to a fewer number of the same type. The stock keeping and cost departments can also be run more cheaply."—W. G. Wall, Chief Engineer, National Motor Vehicle Co.

#### Packard Uses Standards

"In designing new parts, we are working to the S. A. E. standards wherever possible. For instance, we have changed all our bolt heads, nuts, lock washers and what you might call standard parts to the S. A. E. standard, with the exception of threads. The Packard company, realizing the necessity for a fine thread on automobile work, standardized a set of fine threads at a very early date before the A. L. A. M. took the matter up. This means that our service departments all over the country are stocked up with our standard threaded parts and we could not make a change at this point without making it necessary to carry in stock an entirely duplicate set of parts.

"We have, however, adopted S. A. E. standards in a great many places where it would not affect our interchangeability list. Among other things, we have adopted the S. A. E. carbureter fittings.

"While we will not benefit from S. A. E. standards as much as people that buy a lot of their material finished, we know that such standards are a move in the right direction and we will gradually work into these standards wherever it does not affect our interchangeability to too great an extent.

"We know that it does simplify work, as draftsmen are always prone to invent something unless they are absolutely held down to a standard.

"We know it has saved us something, but as we had our parts pretty well standardized before this move, we have not saved as much as other companies probably have. We know of no way to get at even an approximate figure of just how much we have saved.

"We certainly favor standardization along sound lines to a degree that will not hamper the individuality of the engineer. There is no use in discussing this point, however, as I believe that practically the entire Society is agreed on this point."—J. S. Vincent, Chief Engineer, Packard Motor Car Co.

#### Room for More Work

"S. A. E. standards have been of most assistance to us in widening the market for readily available material and parts. The fact that certain materials are carried in stock by supply houses and by more than one supply house elimnates the uncertainty of delivery as well as reducing the cost. I find supply houses willing to carry in stock standard parts when they would not before carry similar parts or material at all, before standardization.

"I regret, however, that there are not more standards directly benefiting the electric vehicle and hope the trend of society in this respect will result in work of value to electric vehicle manufacturers. This is not to say that there are not already some standards which are of great value to both the gas and electric types of vehicles. I believe, however, that there is room for a great deal more standardization and I think that more work along this line is going to be speedily accomplished."—H. H. KENNEDY, Chief Engineer, The Waverley Co.

**Saves Trouble—Pierce-Arrow**

"The true value of the work of the Standards committee of the S. A. E. combined with the work of the technical branch of the A. L. A. M. can only be fully appreciated by those automobile manufacturers who were in the business prior to the time of such standards. The Pierce-Arrow Motor Car Co. had to design from the very first special screws, nuts, bolts, etc. With a finer thread than the U. S. standard, difficulty was experienced in purchasing special taps and dies, gauges, etc. All these had to be made by us. The tapping hole for spark plug was always a source of misunderstanding and annoyance. The Pierce-Arrow Co. adopted the metric as that was about the only standard at that time. Other manufacturers used a gas thread and there were quite a number of other sizes in vogue. It was difficult to get a correct metric thread from the American spark plug manufacturers.

"In regard to specifications for materials, the Pierce company had to formulate its own steel, cast iron, bronze and aluminum specifications. Frequently these conflicted with the steel manufacturers and foundries, endless correspondence resulted, frequently a compromise had to be accepted, as few of the large producers cared to cater to individual requirements unless the tonnage involved was very great. Where a steel mill consented to work to special specifications, they charged excessively, and frequently we were delayed in manufacturing by the material not being delivered on time. This led to purchasing some of the alloy steels abroad and we frequently could get more prompt shipments from the foreign houses. Most of the drop forge companies had never heard of heat treatment as applied to forgings.

"Now the S. A. E. standards are recognized. We scarcely ever need go outside the S. A. E. material specifications to find the grade of material we desire to use, and we have the assurance that these can be supplied promptly by a dozen different houses.

The S. A. E. standard threads for nuts, bolts, etc., are a great boon, especially in case of any equipment purchased from outside sources. Spark plugs can be had anywhere that will be a fairly good fit in the cylinders. The S. A. E. limits on ball and roller bearings are already tending towards a better product at no additional cost."—D. FERGUSSON, Mechanical Engineer, The Pierce-Arrow Motor Car Co.

**Timken Uses Three Standards**

"The S. A. E. Standards which affect our work peculiarly are only three at the present time, namely, the finish of brake lever eyes, the finish of pinion shaft for the universal joint flange and the dimension of splines for shaft fits.

"Regarding the latter, this company had already adopted its own standard before the S. A. E. adopted theirs. We shall, however, on new work adopt the S. A. E. standard for this class of work in every case.

"On the matter of pinion shaft finishes, the adoption of the S. A. E. has been of very considerable benefit to us. One of the most annoying things in connection with axle construction is the different finishes on pinion shafts which individual motor car manufacturers have in the past insisted upon. Within the last year or more our policy has been to urge, and insist upon—as far as possible—the use of the S. A. E. Standard taper sizes, and we are pleased to say we have gotten very nearly all of our customers over to this construction.

"In the matter of brake lever eye sizes there has in the past years been a great deal of confusion, but it is growing constantly less because of the adoption of S. A. E. standards by motor car manufacturers. We throw all of our influence in that direction and the adoption by the car builder of S. A. E. Standards has enabled us to reduce the number of parts to manufacture and to carry in stock, in the way of brake levers particularly. We are heartily in accord with this work of the Society, and while it is a difficult matter to figure out in dollars and cents the actual saving to us, it is very easy to notice the saving in confusion and complication of parts going through the plant, and we sincerely hope that this standardizing activity of the Society will continue.

"It really has been of unquestionably very great advantage to us and we would welcome a reasonable extension of standards to other parts of our axles, as experience and occasion will make possible."—H. W. ALDEN, Chief Engineer, The Timken-Detroit Axle Co., Detroit, Mich.

"The work of the Standards committee of the Society of Automobile Engineers to the Cunningham factory has certainly leveled off a lot of knotty points, both from the standpoint of design and manufacturing.

"We have followed the policy of adopting S. A. E. standards at every point where we have been able to work them in. Manufacturing conditions in some instances have delayed the adoption of some of these standards, but we work them in as fast as possible.

"One of the great advantages from the manufacturing standpoint is that we are able to write our specifications, calling for certain material, and simply note that it is to be of S. A. E. standard. This is then indicated on the orders of our purchasing department, and when the goods arrive they are invariably found to be what we want. Without the S. A. E. standards many goods would necessitate considerable description, which might be misinterpreted by our purchasing department, and in turn by the concerns from whom we buy, with the result that many errors would creep in, as they actually did in days before the S. A. E. standards were made, and no end of trouble was the result.

"We most heartily recommend the work of the Standards committee, and certainly trust that the good work will go on for there are many other features about automobiles which could be taken up by the committee without in the least curtailing originality of design."—V. E. LACY, James Cunningham, Son & Co., Rochester, N. Y.

**Facilitates Work in Drafting Room**

"The standards recommended by the committee have been of assistance because of the fact that manufacturers of carbureters, spark plugs and small fittings are making their products to conform to the standard. Also the metal standards, having to do with composition and heat treatments of steel as well as bearing metals greatly facilitate work in the drafting room and purchasing department. We are also much interested in the standardization of motor mounting dimensions and transmission flanges and our newer models conform to the standards recommended as closely as possible.

"The work of the society has been of great value to the manufacturer who has taken advantage of it and should receive the hearty support of all people engaged in this line of work."—PITTSBURGH MODEL ENGINE CO., Pittsburgh, Pa.

**Benefit to Industry—Lozier**

"The value of standardizing certain parts entering into the construction of motor cars, both from the stand-

(*Continued on page* 77)

# Proposes Standardization of Car Sizes

## The Automobile Engineers' Forum

### Such a Plan Would Render Possible Thorough Standardization of All Parts, Would Reduce Manufacturing Cost and Selling Price and Facilitate Repairs and Replacement

DETROIT, MICH.—Editor THE AUTOMOBILE:—President Leland's address before the Society of Automobile Engineers is to be admired for its sentiments, but I beg to take exception to his quotation from Bailey, in which he says:

"He most lives who thinks most,
Feels the noblest, acts the best."

This statement, as with everything else in the world, depends on conditions. For instance, there are many inventors or so-called inventors who have thought a lifetime on a subject and never accomplished anything, for the simple reason that they had not been thinking along the proper lines.

**The Public Neglected?**

Here is, to my mind, another practical illustration:

The S. A. E. has begun to create standards that to all intents and purposes assist the manufacturers, but the public and user, the main issue, have been entirely eliminated. Their thoughts have been all on the saving in manufacture and in doing so have confined their thoughts to the standardizing of parts instead of cars, with the result that there have been two thoughts most of the time when one would have produced greater benefits.

**Standardize Car Sizes**

You will notice I said standardizing cars instead of parts. At present there are about ten grades of cars, according to price. To be plain, we will say there are $500, $750, $1,000, $1,200, $1,500, $1,800, $2,000, $2,500, $3,000, $3,500, $4,000 cars. There are more, of course, but this is by way of illustration, and these cars all have different weights, different models, to the number probably of 100, these then have parts to the number of 4,000, and the S. A. E. has begun to standardize these parts, which to me is like having 4,000 beans and ten peas mixed up and starting to pick out the beans. What I would suggest is to pick out the ten peas from the beans, or in other words to set a standard of weight for cars. A 500-pound car, a 750-pound car, 1,000-pound car, a 1,500-pound car, an 1,800-pound car, a 2,400-pound car or chassis—from these six sizes a man can get any kind of a car he wants; each of these shall be standard length of wheelbase for each weight; each will have a standard engine support, standard cross members, standard radiator setting or support.

**Standard Wheel Sizes**

Having decided the weight of chassis in designing we know we could have standard size wheels for this chassis; therefore we would have standard size tires, for example: a 500-pound car would have 28 by 2 1-2; a 750-pound car would have 28 by 3; a 1,000-pound, 30 by 3; a 1,500-pound, 32 by 3½; 2,000-pound, 34 by 4; 2,500-pound, 36 by 4½. We would then have six standard tire sizes instead of forty-six according to a catalog I have at hand, and, mind you, the tire companies are in a position to give you much better service than you are now getting; competition will be more uniform and manufacturers can offer no excuses for putting on any but the proper size tire. While we are on the tire question let us take up the rim question. A great source of unnecessary weight and expense to both maker and user alike is the demountable rim, which should be abandoned as well as the old solid clincher. The quick detachable is a good, simple and efficient arrangement and cannot be improved upon, provided you have a good mechanically operated air pump.

**Ordering Parts by Car Size**

Having standard wheels we may now have standard hubs and bearings as well as standard spindles and axles so that it would be only necessary to go to a first-class supply house and ask for a front bearing for a 1,500-pound car or a front left hand steering knuckle for a 1,000-pound car. We could have standard springs, standard shackles, standard front axles, of which about six sizes would take care of every car made; the design could differ for the different ideas of different makers but their dimensions would have to be standard. We could have properly designed brake runners that would fit one and all standard brakes, shoes, etc.; the same principle applies to all; why not standardize them?

**Standardize Fuel Feed**

We have now three methods of feeding gasoline to carbureter, gravity, vacuum and pressure, and three or four places to put them. Why not standardize these? Make one size for each of the different size cars, one place to put it and have pressure feed. This is the best when properly applied. We can now put our carbureter as near the cylinders as necessary and instead of a standard flange for the carbureter we might standardize the intake, whether it be cast in the cylinder block or not. This would give standard gas pipe connections and fittings and standard throttle connections on steering gear and accelerator. We could also standardize a place for the steering column and have manufacturers mark their product to fit the car in place of making the car to fit their products.

**Dropping Fads and Fancies**

Automobile designers in the past have had too many fads and fancies; they think they must change something or they are not doing anything. They want to do now what foreign makers have done to a certain extent—to find out what really and positively is best, like the ideal car which was discussed at the meeting of the S. A. E. On some subjects there is a chance for endless argument; these must be taken up in a scientific manner and if properly thought out will be of inestimable value.

I have here only touched on a subject of gigantic proportions. The details I have mentioned form the foundation of my reasoning and it is only through discussion and criticism, and I might add, tests, that the Ideal car shall ever become a reality. In the same manner we might treat the horsepower of chassis; for a 500-pound chassis we could use a 10-horsepower engine; for 750 pounds, a 15-horsepower; 1,000, a 20-horsepower; 1,500 pounds, a 24-horsepower; 2,000 pounds, a 30-horsepower; 2,500, a 40-horsepower. This would

equalize racing, making it easier to judge the merits of cars and place cars in the proper class. It is only through an organization such as the S. A. E. that this work can be accomplished, after which, I believe, the industry will be on a better manufacturing and commercial basis.—WILLIS A. SWAN.

## Thinks Brakes on Cars and Trucks Are Often Inefficient

WILKES-BARRE, PA.—Editor THE AUTOMOBILE:—It pleases us to note that you are giving attention to the question of brakes on automobiles as mentioned in your editorial June 18 issue of THE AUTOMOBILE.

We have been laying a great deal of emphasis on the question of reliable brakes in our advertising the last 2 years, and, in this portion of axle equipment, have always considered safety as the first and foremost consideration. Our brake equipment for motor trucks has been developed here in the mountains, and we believe that we have the most efficient brake as the result of this, of any equipment on the market.

Some of our customers have been inclined to think that we demand more of the brake than we should, but we believe that is not true as it will only be a question of time when the city fathers will exercise and take steps towards an examination and testing of brake equipment on automobiles and trucks especially in the congested districts. It is surprising to see what a large number of equipments are in operation in various parts and dangerous parts of the cities with brake equipments that will hardly stop the truck in its length without load, to say nothing of what would happen if the truck were called upon to stop suddenly with its full load. All of our brake equipment is designed to safely handle a truck with its full rated load, and lock the wheels without difficulty.

We believe that you are doing a lot of good for the motor truck industry in particular if you continue to lay emphasis on this subject of Safety First in brake equipment.—THE SHELDON AXLE CO.

## Makers Save by Using S. A. E. Standards

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point of production and economical purchase of material, has been proven by the extensive adoption among automobile manufacturers of the various standards evolved by the Society of Automobile Engineers.

"The Lozier Motor Co. has been specifying S. A. E. standards for some time, covering such parts as lock washers, yoke ends, spark plug threads, shaft tapers, copper tube fittings, bolts, nuts, screws, studs, etc., and contemplates the adoption of further S. A. E. standards as soon as they may be advantageously worked in.

"The use of such standards not only enables the manufacturer to obtain prompt deliveries on a stock article, thus eliminating the long delays consequent on a special parts proposition, but also tends towards rapidity and economy in production. Also the matter of standardization from a service standpoint is a most important item.

"From our own experience we believe the work of the Standards committee of the Society of Automobile Engineers has resulted in much good to the industry generally, and their continued efforts along these lines should prove beneficial to all concerned."—J. G. PERRIN, Chief Engineer, Lozier Motor Co., Detroit, Mich.

**S. A. E. Standards—Best Practice**

"The value of the work of the Standards committee of the Society of Automobile Engineers is imperative to every manufacturer of automobiles. The greatest value in the work of the Society of Automobile Engineers' Standards committee is the fact that they have created standards for parts, which represent the best accepted practice for the particular kind of work which these parts have to perform, the design of which is accepted by all of the engineers of the automobile industry.

"The creating of the S. A. E. standard of bolts, nuts and lock washers, yoke ends and I-rod ends has placed every manufacturer of automobiles in a position to purchase these articles from practically any manufacturer of screw machine parts, and a great many of the manufacturers carry these parts in stock for immediate delivery at a very small increase in price over the less desirable article which they replace.

"The recommendations made by this committee have caused the steel manufacturers to produce and carry in stock alloy steels in special sizes and shapes to meet the requirements of work these particular parts have to perform in the construction of automobiles.

"The above, to my mind, represents the greatest advancement in automobile manufacturing and has been of great benefit to the engineers of the various factories in their ability to obtain material which is best suited for their requirements." — R. S. FEND, Chief Engineer, Woods Motor Vehicle Co., Chicago, Ill.

**Standards of Value—Cadillac**

"We are heartily in favor of standardizing the various parts that go to make up an automobile, and we know that standards thus far established have been helpful.

"Perhaps the reason that we have not used more of the S. A. E. standards up to date is because we were manufacturing automobiles many years before the S. A. E. was active in formulating standards, and our management was not entirely satisfied with the then existing standards, or rather lack of standards. Therefore we established some systems known as Cadillac standards, that seemed to meet our requirements much better than anything available at that time. And because of establishing certain standards which have been incorporated and are interchangeable in our various machines, we have been quite reluctant to adopt some of the S. A. E. standards until we might be designing something entirely different from our previous construction, so that we could afford to ignore our past standards, in which case we give careful consideration to the S. A. E. standards and adopt them as far as possible.

"We believe that eventually the S. A. E. standards will be of great value to the automobile industry."—E. E. SWEET, Consulting Engineer, Cadillac Motor Car Co., Detroit, Mich.

**Interchangeability of Parts Increased**

"We use S. A. E. standards on all yoke and rod assemblies and on all bolts and nuts with the exception of such bolts as are used in aluminum. We find the standards of the S. A. E. satisfactory in every respect and will continue to enlarge on our use of them.

"We think the Standards committee is entitled to a great deal of credit for the work they have done and we trust that they will pursue the subject in the future with the same amount of vigor that has been displayed in the past as we feel sure that nothing but good will come of it."—W. J. PECK, Chief Engineer, Bartholomew Co.

# Center Steer on Buffalo Electrics

## Motor Acts as Brake in New Five-Seater—Cantilever Rear Spring Used

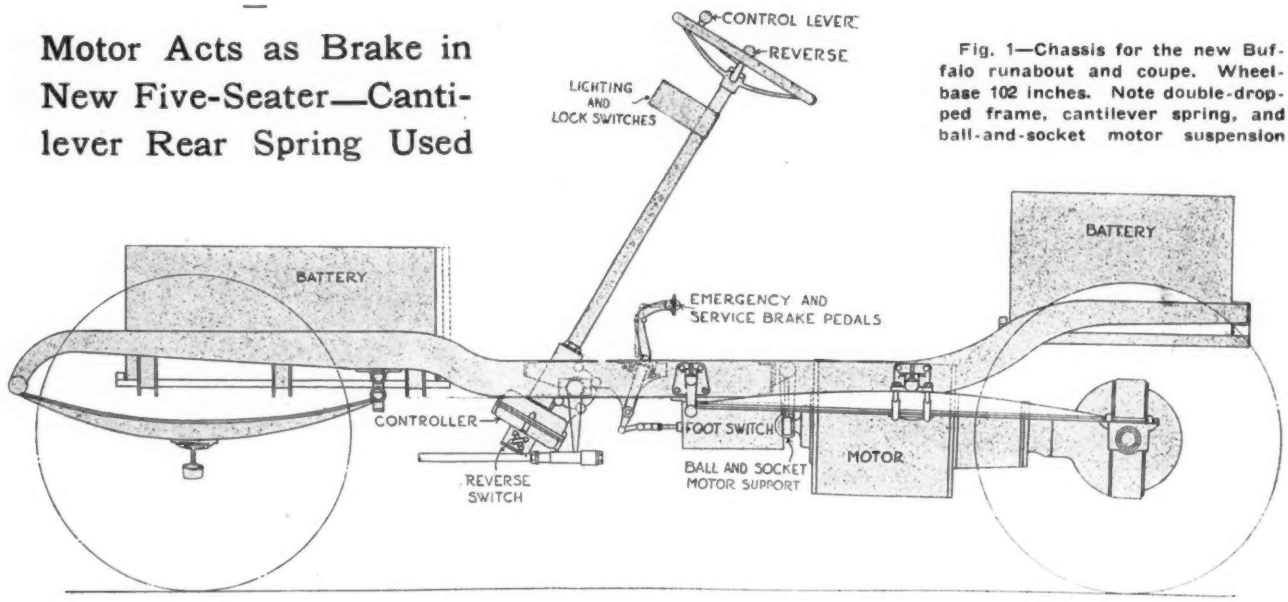



Fig. 1—Chassis for the new Buffalo runabout and coupe. Wheelbase 102 inches. Note double-dropped frame, cantilever spring, and ball-and-socket motor suspension

THE Buffalo Electric Vehicle Co. comes forward this year with a model that not only differs in many important features from the Buffalo electrics of previous years but one which possesses characteristics that distinguish it from the general field,

Most pronounced of these radical changes is the introduction of a central control system, that is, the central position of the steering wheel and brake pedals, the driver occupying a seat strictly in the middle of the floor. The vehicle seats five, two swivel seats being in front with sufficient space between them to allow an unobstructed view for the driver, while the remaining two seats are located at each side and slightly to the rear of the driver, Fig. 2.

Other changes over last year's models are the use of cantilever springs at the rear, a double-dropped frame, and a ball and socket front end support for the motor. The body has also been entirely redesigned to streamline principles and as shown in Figs. 6 and 7 the result is highly satisfactory. The method of regulating the motor by means of a lever on the steering wheel in addition to a foot controller operated in conjunction with the service brake pedal is retained.

### Motor Acts as Brake

The motor used is again of Diehl manufacture but it is a special design so wound that the driving speed of the car is largely automatic irrespective of the grade over which the vehicle is traveling. This feature is obtained by using the motor as a brake on down grades, the braking effort being controlled automatically by the speed at which the car attempts to run. The current generated at this time by the motor in its capacity of a generator passes as charge into the battery. In this way a considerable extension of mileage per battery charge is obtained. The winding is shunt and the control is arranged so that the armature is never broken while changing speeds, the variation being effected only through resistances inserted in the fields.

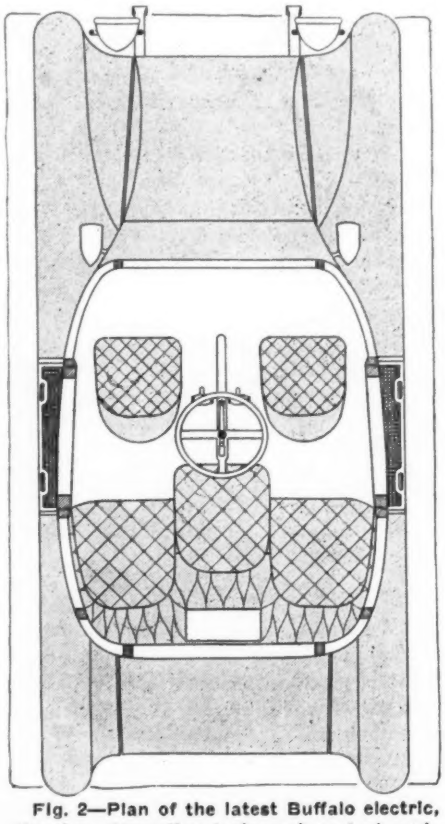


Fig. 2—Plan of the latest Buffalo electric, showing streamline body and central position of driver's seat

The controller is of the circular type and is remarkably compact. It occupies a position at the base of the steering column and operates by a radial brush arm actuated directly through the steering column by a short lever, Fig. 4, on the handwheel. Immediately beneath it and attached to the base is a reversing switch of the sliding contact type. This switch is operated by a knob in the center of the steering wheel. By means of a key at the top of the reverse switch rod sliding into a keyway in the boss of the control lever it is impossible to use the reversing switch except when the control lever is in the neutral position. The small size of the reversing switch is possible by the method of reversing the motor on the field instead of on the armature. The current passing around the field of a shunt wound motor being small the copper parts of the switch can of course be made correspondingly light.

### Pedal Control Continued

In addition to the hand controlling device the Buffalo Co. still make use of the pedal operated switch which is capable of controlling the car within speeds of 9 to 20 miles per hour. The foot switch is located under the floor, Fig. 1, and is connected by linkage to the emergency brake pedal. It is a three-point regulating switch affording all necessary resistance for starting, stopping, and speeds up to 9 miles per hour. It will thus be seen that the car can be started by the pedal without the hands being used for other purposes than steering.

A distinct departure from ordinary practice in electric design is the support of the motor on a single point at the front end in place of the double-trunnion suspension used last year. The new suspension consists of a bronze ball in a steel socket hung from a cross member. No universals are used and therefore the torque is taken directly by the drive shaft casing which connects the motor solidly with the rear axle housing. The axle used is of Timken manufacture with the new curved bevel differential by which it is claimed extreme quietness of running is obtained. There is no other reduction that the differential, which has a ratio of 5.13 to 1 with the motor shaft. Both brakes act on 14 by 2.25-inch drums on the rear axle.

Several interesting details of body design are noticeable in the new coupé, besides the seating arrangement. All angles have been removed from the outline which is streamline as much as possible. The hood over the battery is hinged where it meets the curved cowl, but the joint is practically invisible by the employment of specially designed concealed hinges, Fig. 5. By the construction of this hinge a close butt joint is always made when the hood is lowered, but to make it absolutely impossible for moisture to work into the battery compartment a curved gutter shown in the illustration is provided to carry off water to the side and through underneath. The battery space this year is large enough to accommodate any make of standard battery, including the Edison. There is no particular battery specified. When the Edison is used 70 A4 cells are carried, being disposed 40 in front and 30 behind. In the plan, Fig. 2, it will be seen how the rear battery space is much lessened externally by placing several of the cells in the center tray between the rear seats. When lead cells are installed the battery consists of 42 15-plate cells with a capacity of 140 hours.

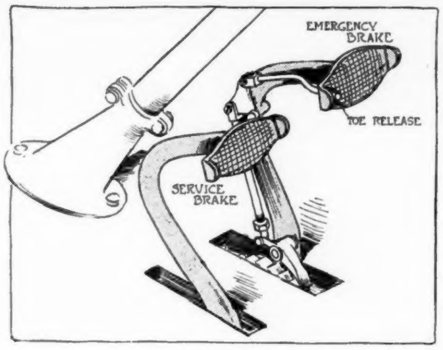



Fig. 3—Brake pedals at the foot of the steering column. The service brake also operates a control switch

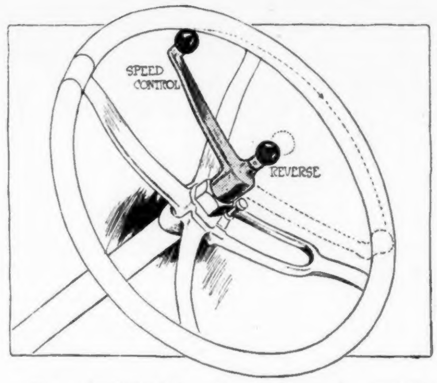



Fig. 4—Showing simplicity of control mechanism on steering wheel. A swing wheel is used for ease of entrance

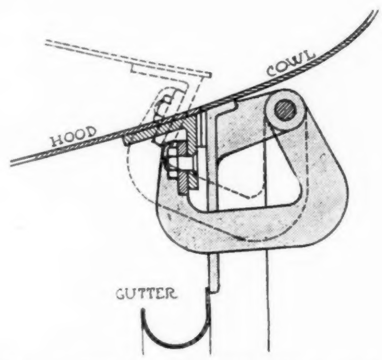


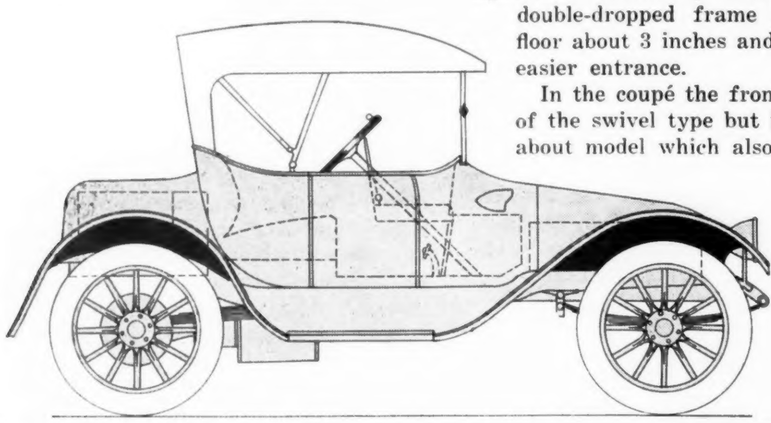

Fig. 5—Special concealed hinge for hood over battery. A gutter is provided to collect any moisture passing through the joint

A double-rain vision shield is fitted and sashless windows in felt runways are used. The door window is operated by a mechanical lifter. The door is 26 inches wide and on opening it a step light is automatically turned on. The double-dropped frame lowers the floor about 3 inches and makes for easier entrance.

In the coupé the front seats are of the swivel type but in the runabout model which also seats five, hinged seats which fold under the cowl are fitted. In both models the lighting switch is mounted conveniently on the steering column as is also a lock switch which cuts off the entire current and prevents the car from being started. An instrument board containing an ammeter, voltmeter and clock is located in the center of the dash. The space at either side is handy for luggage. Between the rear seats of the coupé there is further accommodation for packages, so that the interior can be left unencumbered. For the comfort of the driver the pedals are made adjustable through a range of several inches, the change being easily effected by a telescopic link just under the pedal. The bodywork is designed and made at the Buffalo Electric factory, including the hoods which are in hammered aluminum fitting flush without beading against the cowl.

In actual road tests made with the new vehicle the economical result of 63 watts per ton-mile has been obtained.

Preparations are in progress for increasing the factory facilities. At present only two models are on the market though the coupé can be fitted with a folding landaulet back if desired. The price of the coupé is $3,200. The price of the runabout is not yet fixed but it will probably be in the neighborhood of $2,600.



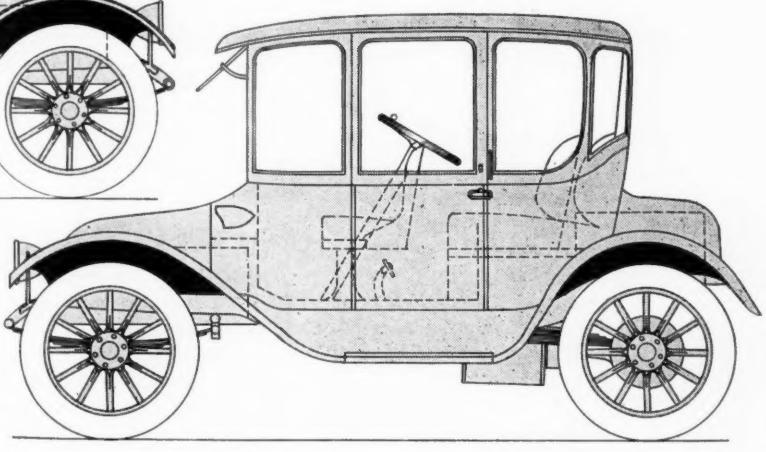


Fig. 6—The new Buffalo electric runabout is built on the same chassis as the coupé. Note low, speedy appearance obtained by smooth exterior lines and the adoption of the double-dropped frame

Fig. 7—Side view of the latest Buffalo coupé, showing arrangement of seats and the use of the interior space behind the central driving seat to accommodate part of the battery

# Economy Is the Truck Tire Issue

## Light Loads, Low Speeds and Tires of Good Materials and Solid Construction Mean Satisfaction for Owner and Maker

*From a Paper Read at the Summer Session of the Society of Automobile Engineers at Cape May by James E. Hale, Experimental Engineer, Goodyear Tire & Rubber Co.*

TAKEN in a broad sense undoubtedly economy of truck operation is the real issue. It follows, therefore, that if an economical tire could be evolved an ideal solution would be at hand.

Solid tires in service under certain operating conditions give certain results in the performance of their functions. These results are dependent on the tires themselves and on the conditions under which the tires are used; consequently we may propose an equation which indicates a balancing condition as follows:

| | | | | | | |
|---|---|---|---|---|---|---|
| The results of service performance, which may be termed "commercial properties" | =f | Operating conditions | & | Tire details or physical properties of the tires | & | Selling cost |

Expanding the terms in parenthesis by itemizing the features pertinent to this discussion we have:

| | | | | | | |
|---|---|---|---|---|---|---|
| Cost per tire-mile<br>Durability (Total Mileage)<br>Resiliency (Power Consumption)<br>Cushioning-effect<br>Reliability<br>Service cost<br>Tractive grip | =f | Loading<br>Speed<br>Spring-suspension<br>Road surfaces<br>Topography<br>Weather<br>Driver | & | Structure<br>Diameter<br>Width<br>Shape cross-section<br>Tread rubber<br>Toughness<br>Attrition-resistance<br>Plasticity<br>Scheme of attachment<br>Weight | & | Selling cost |

The commercial properties, representing as they do the results of service performance, are of particular interest as they are a measure of the satisfaction received. Cost per tire-mile, durability, tractive grip, service cost, and power consumption are all capable of being expressed by exact numerical values. Cushioning effect and reliability are indefinite but none the less important.

The operating conditions, loading, driver, and to some extent, choice of road surfaces are under the control of the truck owner. The spring suspension is wholly and the loading to some extent under the control of the truck designer. Topography, weather, and in part the road surfaces must be accepted as they are. Of the operating conditions, loading and speeding alone may be expressed in numerical values.

The items under tire details pertain to the physical properties of the tires themselves and are self-explanatory.

In this discussion it may be noticed that cost or money value is mentioned only in connection with the commercial properties of the tires. Of course the item of cost is present on the other side of the equation in the various subdivisions of the tire details.

### Value Is in Materials

*Without being specific as to the precise relation between cost and tire details, let it suffice to say that the value of the finished product is largely in the materials which enter into its fabrication.*

This equation is explained as representing a balancing condition. Of course this is true enough if we have been careful to include all the component subdivisions relative to the main parentheses of the equation. It will shortly be pointed out that practically all the terms on both sides are variables between rather wide limits and that broadly speaking the whole situation centers about what we do not know and what we want to know about the effect produced on the "commercial properties" by changes or alterations of the various "tire details" or "operating conditions."

To take an example, we might accumulate data upon a certain tire of average physical properties and which had been in service under average "operating conditions" (Chicago for instance) and for commercial properties we would find the cost per tire-mile to be ¼c. The mileage given, 10,000, the power consumption, 9/10 horsepower-hour per ton-mile per tire, the tractive grip represented by an average coefficient of friction of .40, a service cost of 1¾ hours interruption of service in changing tires, and the cushioning in its effectiveness to reduce destructive vibration while not capable of definite expression in figures is nevertheless a very important and definite quantity.

### Cost per Ton Mile Increased

Now, if we change any of the variables on the right-hand side of the equation this will naturally result in a change in one or more of the commercial properties. Assuming for instance that the speed (that is the average speed at which the truck is driven) be diminished, we will find the cost per tire-mile decreased, the durability increased, the resiliency altered, the cushioning effect increased, the reliability increased, the tractive grip probably increased and the service cost unaltered. On the other hand suppose we change one of the physical properties of the tire, say stiffen the compound. The cost per tire-mile would probably be reduced, the total mileage probably increased, the cushioning qualities decreased, the reliability unaltered, the tractive grip diminished, the service cost unaltered, and the

## Haleisms on Truck Tires

1—**The value of the finished tire is largely in the materials which enter into its fabrication.**

2—**A tire which runs its mileage guarantee without developing any distressing symptoms is satisfactory.**

3—**A tire that exceeds its mileage guarantee will get the business in the future.**

4—**A tire that fails to give the mileage guaranteed gets a black eye.**

5—**Service helps to sell tires.**

6—**Extremes of heat or cold have a detrimental effect on the rubber and increase cost per ton mile.**

7—**The lighter the load and the slower the speed the lower the cost per ton mile.**

8—**Resiliency will presently occupy a decidedly more prominent position in the list than it has in the past.**

9—**Truck operators should recognize the possibility of greater economy from the use of efficient tires, just as does the electric truck owner.**

10—**The resiliency of the tire is largely dependent on the compounding of the tread rubber.**

power consumption decreased or increased according to road surfaces.

**The Feature Tire**

ALTHOUGH THE CIRCUMSTANCES ARE FAMILIAR TO EVERYBODY, LET US ENTER HERE AS A MATTER OF RECORD AND COMPARISON THE EXISTING SCHEME OF JUDGING THE SATISFACTION OBTAINED FROM THE SERVICE OF SOLID TIRES. IN A FEW CASES, NOTABLY AMONG THE LARGE OWNERS, COST OF TIRE-MILE RECEIVES CONSIDERABLE ATTENTION, BUT IN GENERAL IT MAY BE SAID THAT A TIRE WHICH RUNS ITS MILEAGE GUARANTEE WITHOUT DEVELOPING ANY DISTRESSING SYMPTOMS IS SATISFACTORY, A TIRE THAT EXCEEDS THE MILEAGE GUARANTEE GETS THE BUSINESS IN THE FUTURE, AND A TIRE THAT FAILS TO GIVE THE MILEAGE GETS A BLACK EYE. ALSO IT OFTEN HAPPENS THAT SERVICE HELPS TO SELL A TIRE.

The "commercial properties" should be discussed more or less in detail since they represent the satisfaction obtained from the use of the tire, and also the possibilities of choosing the best possible combination of component operative conditions and tire details to fulfill the requirements of the "economical tire." In what follows it should be borne in mind that economy of truck operation taken as a whole determines for our discussion the actual values of the commercial properties of the "economical tire."

**Cut Tire-Mile Cost**

Obviously it is desirable to have the cost per tire-mile as small as possible consistent with the complete qualifications for economical truck operation. This is one of the most important of the commercial properties in the matter of economy and it happens that it is dependent on practically all of the subdivisions of the operative conditions and physical properties of the tires. The better the road surfaces and more nearly level the country, the lower the cost per tire-mile. Likewise the tires will show up better under a careful driver than a careless one.

**Factors in Wear**

As for weather, extremes of heat and cold have a detrimental effect on the rubber, consequently increasing the cost per tire-mile. Spring suspension is mentioned as one of the operating conditions. This may seem a little far-fetched, yet we know that the efficiency of the springs in performing their functions has a very decided effect on the life of a tire.

Considering now the load on the tire and the speed at which the truck is operated, *all will agree that the lighter the load and the slower the speed*, the lower the cost per tire-mile, but returning to our fundamental idea of economical operation of the truck there is undoubtedly one combination of load and speed (assuming tire equipment of specific "physical properties") which will give a maximum effect in the matter of truck operating economy, yet the cost per tire-mile will be greater than were the speed to be slower and the load less. Again by simply altering one of the tire details, say stiffening the compound, an entirely new set of relations will be established, with the result that the economical load and speed will differ from those of the preceding case. Change the structure, diameter, width or shape separately or collectively and our economical load and speed have to be sought anew and also a new cost per tire-mile.

**Tire Durability**

Strictly speaking durability is a property which is closely allied to that of cost per tire-mile and there is a strong temptation to believe that they are inversely proportional.

The principal exceptions to this are to be found in the details of the tires themselves. Thus it is perfectly possible to compound the tread rubber to give a very low cost per tire-mile and at the same time produce a tire which would give but small total mileage. The same idea could apply in the case of the structure of the tire under certain circumstances. Apparently the predominant attitude of the wideawake truck owners is decidedly favoring the choice of tires which run long mileages. The importance of uninterrupted operating schedules is undoubtedly largely responsible for this condition; moreover it is probably true that many owners would feel justified in sacrificing, if necessary, a slight saving in tire cost if it came to the point of choosing between the two properties.

**Resiliency in Future**

Resiliency will presently occupy a very decidedly more prominent position in the list than it has in the past. The requirements of electric vehicle practice have for some time demanded the most efficient tires possible; some manufacturers even make the other commercial properties secondary to this one. Surely gas truck operators should recognize the possibility of greater economy from the use of efficient tires just as does the electric truck operator.

AN EXAMPLE WILL EMPHASIZE THIS POINT. IT IS VERY EASY TO PICK OUT FROM AMONG THE BRANDS AND TYPES OF TIRES ON THE MARKET THOSE WHICH WILL ABSORB 25 TO 40 PER CENT. MORE ENERGY THAN THE MOST EFFICIENT; CONSEQUENTLY IF A 3-TON TRUCK CONSUMES SAY FROM $400 TO $500 WORTH OF GASOLINE A YEAR, A VERY CONSIDERABLE CASH SAVING COULD BE MADE BY USING MORE EFFICIENT TIRES. AS THE RUBBER IS "LIVELY" OR "DEAD" (BY VIRTUE OF THE NATURE OF THE COMPOUNDING) SO WILL IT BE EFFICIENT OR INEFFICIENT WHEN MEASURED FOR POWER CONSUMPTION. THE STIFFNESS OR PLASTICITY OF THE COMPOUND ALSO PLAYS AN IMPORTANT PART IN THE DETERMINATION OF EFFICIENT PERFORMANCE.

EFFICIENCY IS VERY DEPENDENT ON THE CHARACTER OF ROAD SURFACE OVER WHICH THE VEHICLE IS OPERATED, PARTICULARLY AS TO THE DISTINCTION BETWEEN ROUGH AND SMOOTH ROAD SURFACES. OTHER THINGS BEING EQUAL THE SOFT TREAD RUBBER WILL GIVE GREATER EFFICIENCY ON THE ROUGHER ROADS.

From the foregoing it will be seen that the resiliency of the tire is largely dependent on the compounding of the tread rubber. To what extent it is dependent on the other physical properties of the tire is somewhat uncertain, but surely not to any marked extent. The efficiency varies slightly with extremes of heat and cold; also with different loads and speeds.

**Cushioning Effect**

The invention and especially the perpetuation of the India rubber tire were possible because of the benefit derived from the cushioning properties of the rubber as a lessener of uncomfortable and destructive vibrations. How many times has it been remarked that automobiles are possible because of the pneumatic tire? It is not true that motor trucks would not be possible without rubber tires? Just think of a 3-ton truck equipped with steel-shod wheels rattling over the average pavement at 8 to 12 miles per hour—and the poor pavement!

**Soft-Tread Tires**

Of course the plasticity or stiffness of the tread rubber is by far the most important item affecting this commercial property and it goes without saying that a soft yielding compound will protect the mechanism of a vehicle better than a hard stiff one.

The remaining items of tire detail each influence the cushioning effect in minor ways. It is rather unfortunate that up to the present time the tire

companies have found no way of making a tread rubber of exceptional cushioning qualities and at the same time of low cost per tire-mile. We find that the softer and more yielding the stock the better its quality must be to give reasonable service, and quality represents price. This fact is also particularly noticeable: Tires made of soft compounds are very much more liable to fail structurally under heavy loading. It might be interesting to remark that there is one critical load for each size tire and for each speed where the cushioning is most pronounced; that is, a lightly loaded tire will bounce and thereby exaggerate vibration; on the other hand a heavily laden tire will show less response in cushioning due to its already highly distorted condition. Tires are similar to springs in this respect.

### Factor of Reliability

The reliability of a solid tire in performing its functions needs very little comment. It is listed as one of the commercial properties because it is a property which is of considerable importance to truck operation as a whole. In the case of truck tires this property is practically entirely dependent on the tire details themselves.

The remarks concerning reliability apply equally well as to service cost; in addition there is of course the question of attention on the part of the selling house.

### Tire's Tractive Grip

The effectiveness of the traction of a tire is dependent on the coefficient of friction between the tread rubber and the road surface. Consequently compound, width, weather (wet or dry), loading and the character and condition of the road surface are the principal elements affecting traction.

On dry surfaces there is no advantage to be found from the use of a notched or broken tread over the use of a continuous tread, for in either case the grip of the tire is dependent on the simple phenomenon of friction between the rubber and road surface. Wet or greasy pavements are well known to be annoying and often dangerous. The coefficient here is exceedingly low, ranging from .11 to .15 or .20, whereas it would be from .50 to .60 on dry pavement. I believe that under certain conditions the coefficient of friction between the tire and the surface can be greater than 1.00. This seems conceivable in the instance of a soft yielding tread compound on a firm rough surface.

### Why Tires Wear

So far nothing has been mentioned about the ways in which tires wear out or fail. This should be outlined briefly as several of the commercial properties are directly dependent on the wearing qualities of the tires. You will notice that the various items under each main subdivision are enumerated as forms of legitimate wear or as forms of abuse. The significance of this is suggestive rather than absolute, the idea being to convey the distinction which one would observe in the case of perfect service.

| | |
|---|---|
| *A—Abrasion of tread rubber, due to* | |
| 1—Tractive effort<br>2—Natural wear of rolling friction | Legitimate wear |
| 3—Skidding<br>4—Spinning wheels by quick starts<br>5—Sliding with brakes set<br>6—Wheels out of alignment | Abuse |
| *B—Cutting, chipping, or spreading of tread rubber, due to* | |
| 1—Sharp stones, glass, etc.<br>2—Poor road surfaces in general | Legitimate wear |
| 3—Car tracks<br>4—Use of anti-skid devices | Abuse |
| *C—Disintegration or deterioration of tread rubber, due to* | |
| 1—Sun and heat<br>2—Allowing tires to freeze | Legitimate wear |
| 3—Oil on garage floor<br>4—Heating by excessive speeding | Abuse |
| *D—Failure of the tire structurally, due to* | |
| 1—Overloading<br>2—Speeding<br>3—Shocks and impacts from reckless driving over uneven road surfaces | Abuse |
| *E—Premature failure or wear due to imperfections of manufacture.* | |

The foregoing is an exposition of the relevant elements entering into the determination of the proper tire sizes. This method of elaborating on the situation is apt to leave the inference that the situation is so hopelessly complicated that there is nothing in particular to be done except make the best of it.

On the other hand, I realize that there are many who, although they will not dispute the truth of the facts presented, will be tempted to depreciate their significance, preferring to dispose of the matter by insisting that "tires are tires" and that it is up to the tire companies to produce the goods. Before us is a summary of the items by which the service performance of the tires are judged and an exposition of the factors on which these various items depend, and finally the possibilities to be taken advantage of in the way of attempting to regulate the tire problems toward more satisfactory ends.

You gentlemen know to what extent operating conditions can be controlled and regulated. As for tire details those having a knowledge of tire design and manufacture realize that with proper attention to compounding and fabrication methods a wide variety of constant results is possible. I wish to bring out one point very emphatically, however: While it is possible to alter tire details so that results shall vary through a wide range, it is also true that if these details be altered with the idea of highly perfecting one commercial property, this may be at the sacrifice of some other property or properties of nearly equal importance.

WHAT DOES THE MOTOR TRUCK INDUSTRY WANT AS QUALIFICATIONS FOR A SATISFACTORY MOTOR TRUCK TIRE?

In other words what is the relative importance of the commercial properties?

Are we getting all the cushioning effect desirable consistent with economy of truck operation?

Should not more stress be laid on the property of power consumption for the ultimate benefit of economic truck operation?

How much should we sacrifice in the cost per tire-mile property and the durability to balance the other properties for the good of economical truck operation?

Manifestly all are not of equal importance. For instance if the cushioning effect be highly developed with the idea of decreasing the truck repair expenses by lessening the destructive vibration, this much is certain, the tread rubber will necessarily be of a soft yielding compound in such an idea. But we will find the cost per tire-mile increased and the durability diminished very materially unless we diminish the load which the tires carry, which in turn will raise the ton-mile cost of truck operation. To a slight extent, with the introduction of additional cushioning effect, the resiliency and tractive grip may or may not be altered.

### Uniform Cushioning

If the stiffness or plasticity of the tread rubber of the various brands and types of tires be compared, it will be found that there is a wide variation. In spite of this, well-known makes of trucks in any locality, equipped with competing tires which exhibit these marked differences, will be found running side by side.

Surely so important a property as that of cushioning effect should be more or less uniform under similar conditions. I often ask engineers, owners, and drivers whether they want a hard stiff tire which will give almost no cushioning to the truck, or a tire which will protect the truck even if the tire-mile cost is a little higher. Some have never given the idea any thought, some (users particularly) do not care anything about the tire so long as it wears, some are looking for information, and a few have such decided convictions in favor of proper cushioning effect that they will not use solid tires of any description and choose the more expensive pneumatic.

This illustration of the relations between cushioning effect and the plasticity of the tread rubber is typical of a multitude of combinations of properties and conditions which might be portrayed. It would be an endless and wearisome task to enumerate and discuss all these combinations.

At the present time the formalities of truck tire merchandizing are limited to a guaranty of perfection in workmanship and a certain maximum cost per tire-mile. Also, each tire company has its own special list of permissible loads which each size of tire may carry.

Without dwelling on the shortcomings of this happy-go-lucky method of dealing in tires, permit me to call to your attention that in the iron and steel world it is customary to buy and sell material which fulfills the requirements of certain chemical or physical specifications. The art has been perfected to such an extent that the measurement of the elemental subdivisions is now a matter of every-day routine in the up-to-date office, and moreover it is recognized that buying on specifications is the only sane policy—fair to both purchaser and seller. Standardization is not by any means limited to steel; Portland cement, paints, chemicals, electrical apparatus, boilers, etc., are all more or less thoroughly standardized.

### The Tire Equation

In outlining the solid tire situation I have proposed an equation representing a balancing condition between the results which the tires give in service on one side, and the details of the tires themselves, the cost of marketing and the conditions under which they are used on the other. By developing this equation in detail I have attempted to emphasize:

1. *The complexity of the solid tire problem due to the innumerable variables into which the whole may be subdivided.*

2. *The importance of recognizing that economy of truck operation in its broadest sense should be the guiding motive behind any solid tire considerations.*

3. *The fact that the performance of solid tires in service has never been given the proper attention in the matter of criticism from the angle of economic truck operation as a whole.*

4. *The logic of recognizing the "commercial properties" and the desirability of discovering their relative importance.*

5. *The limitations encountered in bringing about ideal conditions due to practically positive inability to regulate or control the operating conditions which are included under road surfaces, topography, weather, and driver.*

6. *The facts that the solid tires are still capable of considerable development and that this development is essentially a process of evolution and elimination; also that there are certain practical limitations in the production of the tires themselves which permit the attainment of high degrees of perfection of certain commercial properties only at a sacrifice of others.*

### Standard to Attain

In conclusion I simply venture a general summary. The ideal disposition of truck tire standardization would be to prescribe standards of commercial properties to be attained when the tires are in service under standard road surface conditions; the variables under this scheme would be the tire details. However, inasmuch as it would be impracticable, to say nothing of being cumbersome, to test each tire for the values of the commercial properties, to determine whether they come up to standards or not, it would develop that once we have arrived at and defined a satisfactory condition in the matter of service performance, the simplest proposition would be to take cognizance of the physical properties of the tires themselves and standardize them together with the loadings, speed, and spring suspension.

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# Recent Court Rulings—Woman Driver Loses

By George F. Kaiser

THE fact that a chauffeur made a statement after an accident between a car which he was driving and a horse and buggy, practically admitting that the accident occurred through his fault and saying that he had been discharged 2 days after the accident, could not be held to bind his employer, was decided by Massachusetts Court recently.

A chauffeur was driving along a road; he came to a horse and buggy; the horse became frightened, shied and dragged the buggy over a bush against a stump; the buggy upset and the woman who was driving was thrown out and injured. She sued for her injuries and her husband also sued the motorist for the loss of her services. The Court decided that the accident was not due to the negligent way in which the automobile was being driven and gave judgment for the motorist.—*Gillett vs. Shaw*, 104 *N. E.* (*Massachusetts*) 719.

### Dealer Liable for Rented Car

Arkansas Court holds that a person letting an automobile and a chauffeur for hire is liable for the chauffeur's negligence when he causes injury to passengers, when the latter exercise no authority over the chauffeur, except to direct him where they wish to be driven.

A man rented an automobile for himself and his guests in Little Rock, Ark., by telephone. When the car arrived he and his guests entered and told the chauffeur where they wished to be driven. On the way the car ran into an express wagon and the man who had rented it was killed and one of the women passengers was injured. There was some doubt as to whether the accident was caused by the negligence of the express man or the negligence of the chauffeur, but it finally was decided that the chauffeur had been negligent. The dealer proved that the chauffeur was an experienced chauffeur; that he had been in his employ for several years and never had an accident but that he had always been careful and skillful and further that the car cost $3,500 and was in perfect condition at the time of the accident. The dealer won out in the lower Court, the Court holding that his only duty was to furnish a safe automobile and a reliable chauffeur. The other side appealed the case, however, and the higher Court said that he must not only furnish a safe automobile and a careful and reliable chauffeur, but the dealer, or his agents, must use ordinary care for the safety of passengers in order that they may be carried safely to their destination and that as the car was exclusively in charge of the chauffeur, and the passengers had no control over him, except to tell him where to drive, the dealer was liable for damages for the injuries caused by the chauffeur's negligence. —*Forbes vs. Reinman & Wolfert*, 166 *S. W.* (*Arkansas*) 563.

### Killed Through Negligence

Pennsylvania Court says that motor car company is liable when one of its cars driven by one of its chauffeurs runs down and kills a man.

A woman brought an action for the death of her husband which was caused by the negligent operation of the dealer's automobile which collided with a delivery wagon driven by the husband. The chauffeur was employed by the company and had as a passenger the company's cashier who was returning after depositing some money in the bank. The Court held that as the chauffeur and cashier were engaged in the company's business at the time of the accident, the company was liable and said that they were engaged in the company's business even though they had gone three or four blocks out of their way for personal reasons on returning from the Bank.—*Witte vs. Mitchell Lewis Motor Company*, 90 *Atlantic* (*Pennsylvania*) 528.

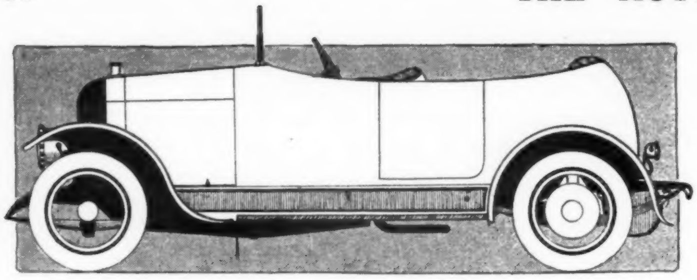


Fig. 1—Ideal ca. with two-door streamline body

# The Rostrum

## Ideal Automobile Has Six Cylinders

EDITOR THE AUTOMOBILE:—A few years ago some automobile makers got the idea that the ultimate type of car had been achieved and for one or two reasons they announced that their machines would incorporate no improvements since they were already as nearly perfect as it was possible to build them. This state of affairs did not last long, however, since the ever increasing number of improvements compelled these builders of perfect cars to change their models or get out of the game.

Today we have many different types of motor cars which resemble each other only in the kind of motive power used. By far the larger number of automobiles are propelled by the internal combustion engine and it seems reasonable to assume that this will be the motive power of the future. Dr. Steinmetz thinks the electric will be the most popular car of the future but surely the electric has not as yet reached as high a degree of development as the gasoline car and there would seem to be several obstacles to be overcome before the electric can become the universal car.

Starting with the premise that the internal combustion engine will be the motive power permit me to give my ideas as to what the car of the future will be like.

First, it will have six cylinders because this is the only type of motor which eliminates vibration and vibration spells death to any piece of machinery.

Second, it will have no hood or radiator as these parts are entirely unnecessary to the successful performance of an automobile. The motor will be air-cooled and all moving parts will be inclosed thus rendering the hood useless.

Third, it will have a simple gearset of two speeds only. More speeds on a very light, powerful six are superfluous. Possibly some form of electrical transmission such as the Entz may find favor.

Fourth, it will have some kind of wood plaster body such as has been brought out in France recently. This body will be plated with some metal, probably aluminum. One of the worst features of present day cars is the noisy, easily dented, metal bodies with their coats of perishable paint and varnish. The metal plated plaster body would overcome all these drawbacks. It would be handsome, durable, noiseless, easily cleaned and repaired.

Fifth, the car of the future will be much lighter than anything we have at present.

The present light six craze is only the beginning of automobile improvement and we have hardly begun to realize what the ultimate car must be like. Of course various other parts of the complicated piece of mechanism called an automobile will be constantly improved and no one can predict with much confidence what manner of vehicle our grandsons and great-grandsons will ride in. However, the above ideas are respectfully submitted for what they are worth.

East Canaan, Conn. D. C. CANFIELD.

### A True Streamline Car

Editor THE AUTOMOBILE:—Since the word streamline seems to pervade the majority of the late automobile advertisements, it is an opportune time to remark about this wonderful new departure in motor car building.

In the first place there is only one American car made that can be called a true streamline car and the price of it is away beyond the pocketbook of the average buyer, this in no way meaning that this particular car is not worthy of the price asked for it,—but why cannot a good substantial car be built around $2,000, that is strictly up to date and embodying the features of the higher-priced cars?

There are many so-called streamline cars on the market, each and every one a perfectly good car, but the interpretation of the meaning of streamline has been misunderstood or is being withheld to be classed in 1917 or 1918 improvements. The accompanying illustration, Fig. 1, gives a clear idea of the *true* streamline body and I see no reason why this clean cut, luxurious style of body cannot be built into a $2,000 car. The industry is flooded now with cars that look too much alike, and because of the enormous production they will be on the wane before long. For this reason it behooves the manufacturers to develop the best automobile type possible, for this is the only type that will stand the reaction that is bound to come in the industry.

The car here shown is, I think, a fine example of a true streamline car. It has a four-cylinder, long-stroke motor with worm drive. The radiator is of the rounded V-type and the bonnet is quite high, which allows the use of a high-sided body yet in no way spoiling its long, sweeping horizontal lines. The upholstery is put in the car so as to be hardly noticeable, and is very thick and comfortable, the cushions of the seats resting on the floor of the body. The body is of the two-door type with the front seat divided and as a very wide body is used it makes this new feature a real comfort. The windshield is built into the cowl which joins the bonnet in a perfectly straight line. Note that there are no side lights, they being placed in the head lights so as to give the car a perfect streamline. The springs are very long and are half elliptic. Wire wheels are used.

This is a clear example of the undeveloped possibilities of body building and it is time some manufacturer grasped the situation and produced a strictly automobile type of car at a moderate price. He will be able to sell all of his product and then some.

Chicago, Ill. JULIAN F. BRASOR.

### Champions Two-Cycle Motor

Editor THE AUTOMOBILE:—I noticed in THE ROSTRUM in THE AUTOMOBILE for June 18, a letter entitled Believes Two Cycle Motor Has a Future. I believe it has a "present" if the tendency in Europe means anything. The two-cycle engine has been adopted by Sulzer Brothers, Switzerland, Krupp of Germany, Carrel Grius, Belgium, Kind of Italy, Vickers of England, all reliable concerns, who have decided that a cylinder can work every stroke instead of loafing half the time, and the funny part of it is they did not make the charge to avoid valves in the combustion space either. It is also evident in the Sulzer case, that no attempt was made to eliminate parts as it has more to it than any four-cycle I ever

saw. The writer has a design for an engine with features that go to raise the standard for high speed work as to power, efficiency and control and has several patentable features that will be shown soon. With only a partial test and the simplest form of motor without one change a three-cylinder, 4 by 4-inch motor developed 28 1-2 at 1,250 revolutions per minute and it can throttle to speeds as low as 185. It is a regular bull dog in power.

Cleveland, Ohio. JAMES MCINTOSH.

### Reader Condemns Muffler Cutout

Editor THE AUTOMOBILE:—I was sorry to see in The Rostrum for June 25, page 1335, that the use of the muffler cutout was advocated. I have been engaged in the manufacture of automobiles for some years and have also driven them for 8 years and can see no excuse for them for any reason. The cutout is almost always abused in use and the car can be tested out just as well without it. Much of the prejudice against the automobile is due to the abuse of the cutout, and there is a large number of people whose nerves are in such a state that they are completely upset by the noise. Many of the states have a law forbidding its use on motorcycles and restricting its use on other motor vehicles; also, several of the leading makers do not equip their vehicles with them. The average driver of a car is not familiar with horses and in consequence the use of the cutout as a signal is dangerous. As a driver who is familiar with all kinds of traffic and in touch with people who use the roads I can only condemn the use of the cutout from all points of view. Another point which is least considered is the dust nuisance which is much aggravated by the cutout and also by the pipe from the muffler being directed downward.

Rockville, Conn. ALLEN HAMMOND.

—If you had read the article in question a little more carefully you would have noted that the following was said: "The unmuffled sound of a well-running motor is very pleasant to the ears of the average motorist, and this alone is sufficient excuse for its (cutout's) use, provided that the motorist does not use the device in towns or cities where the noise would be a nuisance."

We do not believe that the motorist should use the cutout anywhere that it will cause annoyance, but out in the country it does no harm and gives not only a pleasant sound, but is of some value as a signal.

### Mud Pan Hard to Remove

Editor THE AUTOMOBILE:—Many motorists and repairmen will agree with me, that it is not an altogether easy job to remove and replace the dust pan of the car. For instance one manufacturer of cars fastened the pan with 8 machine bolts to the frame, and it took me and another man over an hour to remove and replace same. I would suggest that manufacturers would do away with the pan entirely and just protect the flywheel from the dirt when a leather-faced cone clutch is used.

I have noticed that manufacturers of cars do not pay the necessary attention to the construction of the universal joint. Some makers protect it with a leather cover fastened with a wire, which is quite insufficient for the wire works loose and does not keep the grease in, and every time you want to grease the joint you have to cut the wire and pull the leather back.

Some others have a metal housing which is very good but the plug hole in many cases is so located that it is impossible to reach it with a grease gun, and a grease gun is absolutely necessary to get the grease all over the wearing surfaces of the universal joint. In many cases I have fitted an elbow to bring the plug hole within easy reach. If a universal joint does not get proper attention it will wear rapidly and cause a dull knock and finally break. Manufacturers should not overlook this important feature.

DelMonte, California. FRANK H. LUMPE.

### Wants Small, Powerful Car

Editor THE AUTOMOBILE:—In your issue of June 18, in which you gave an account of the Isle of Man race, a car of French design, a D. F. P., with four-cylinder motor 2.8 by 5.1 inches and rated at 15 horsepower, proved that it was fast, good on the hills and well-built.

Will you please tell me the name of the American car that answers the above description best?

Yonkers, N. Y. PROSPECTIVE PURCHASER.

—We know of no American car that resembles to any great degree the car that you mention. The best we can do is give you a list of machines equipped with four-cylinder motors of 3.5-inch bore or less, together with the names and addresses of the manufacturers and the prices of the cars.

| Make and Model | Bore | St'ke | Manufacturer | Price |
|---|---|---|---|---|
| Carnation | 3.375 | 3.75 | American Voiturette Co., Detroit, Mich. | $ 495 |
| Cartercar, 7 | 3.5 | 5 | Carter Co., Pontiac, Mich. | 1,250 |
| Continental, 30 | 3.5 | 5 | Martindale & Millikan, Franklin, Ind. | 1,000 |
| Davis, 35 | 3.5 | 5 | G. W. Davis Carriage Co., Richmond, Ind. | 1,335 |
| Detroiter, A | 3.5 | 5 | Briggs, Detroiter Co., Detroit, Mich. | 900 |
| Grant, 21 | 2.75 | 4 | Grant Motor Car Co., Detroit, Mich. | 495 |
| Hupmobile | 3.25 | 5 | Hupp Motor Car Co., Detroit, Mich. | 1,050 |
| Marathon, Runner | 3.5 | 5 | Marathon Motor Works, Nashville, Tenn. | 925 |
| Monarch, 4 | 3.19 | 5 | Monarch Motor Car Co., Detroit, Mich. | 925 |
| Oakland, 36 | 3.5 | 5 | Oakland Motor Car Co., Pontiac, Mich. | 1,200 |
| Partin-Palmer | 2.75 | 4 | Partin Mfg. Co., Chicago, Ill. | 495 |
| Paterson, 33 | 3.5 | 5 | W. A. Paterson Co., Flint, Mich. | 1,200 |
| Read, 30 | 3.5 | 4 | Read Motor Car Co., Detroit, Mich. | 850 |
| Saxon | 2.625 | 4 | Saxon Motor Co., Detroit, Mich. | 395 |
| Studebaker, 4 | 3.5 | 5 | Studebaker Corp., Detroit, Mich. | 1,050 |
| Vulcan, 27 | 3.375 | 5 | Vulcan Mfg. Co., Painsville, Ohio | 750 |

### To Attach Hartford Shock Absorbers

Editor THE AUTOMOBILE:—1—Please explain how I could place Truffault-Hartford shock absorbers on my Hupmobile 32? Use sketch showing where to attach them on rear spring.

2—Would you advise installing them on this car? Do you know of a shock absorber that would give better results than the Truffault-Hartford?

Cleveland, Ohio. THOMAS LINLEY.

—1—Drawings showing the method of attachment of these shock absorbers to the Hupmobile 32 are given in Fig. 2. At the left the installation of the shock absorber on the rear of the car is illustrated, and at the right the front shock absorber is shown attached. The front shock absorbers are attached in the ordinary way, that is, lengthwise of the car,

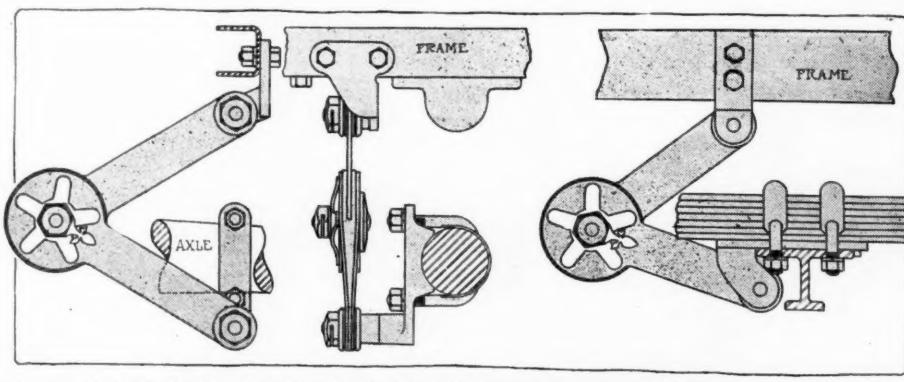



Fig. 2—Method of attaching Hartford shock absorbers to Hupmobile 32. The attachment of the rear pair is shown at the left and the front pair at the right

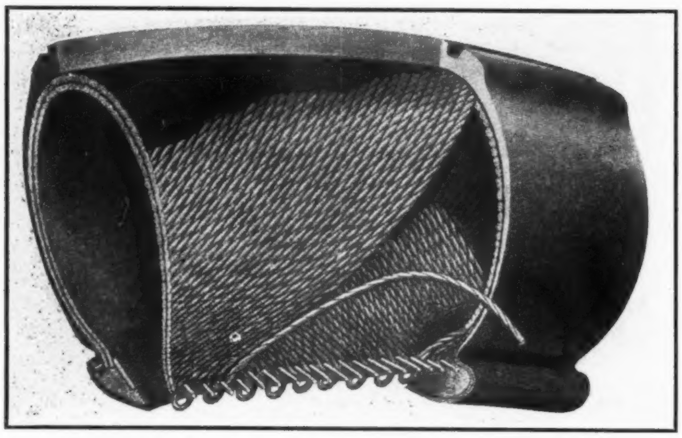


Fig. 3—Construction of Goodrich Silvertown Cord tires

but in the rear they are attached cross-wise because a transverse spring is used in the rear.

It will be noted that in putting on the rear shock absorbers two holes are drilled in each side member of the car frame and that a bracket on the upper arm of the shock absorber is bolted to the frame at this point. The lower arm of the shock absorber is clamped around the axle as indicated.

Likewise, the upper arm of each front absorber is attached to the frame by a bracket held by two bolts while the lower arm is attached to the axle by means of a bracket that goes between the spring and the axle.

While the attachment of these shock absorbers is a simple matter, there is no reason why you should attempt it as this will be attended to by the agent that sells you the shock absorbers.

2—Just as we have stated many times before we cannot advise any of our readers as to what is best and what is not best. In order to give authoritative opinions on such questions as this one you have asked we would have to exhaustively test every automobile and accessory brought out, and obviously this is impossible. Yet it would not be fair to either our readers or the manufacturers if we based conclusions on anything less than the results of long and careful tests. It certainly would not be right to give advice based on our own opinions after seeing these devices in action, or after reading the catalogs or on somebody's unreliable advice.

### Cord Tires Take Less Power

Editor THE AUTOMOBILE:—I notice in June 4 issue you mention that cord tires were used in the big race, at Indianapolis. How do they differ from the ordinary tire and how much higher priced are they? Would it be an advantage to use them for country roads?

2—On page 1170 of the same issue you mention a 13 to 37 gear ratio for a Ford. Would not this be much stronger and also give a car more power? Where could I buy it?

Plentywood, Montana. JOE A. KAVON.

—The Cord tires differ from the ordinary tire in that instead of using a fabric of canvas cloth to hold the pressure a cotton cord construction is employed. Fig. 3, shows the construction of the Goodrich Silvertown cord tire.

It is claimed for these tires that they are more resilient, flexible and stronger, and less liable to rim-cutting. The greater flexibility means that less power is required to drive the car and the increased strength augurs more life and less liability to blowouts. It is claimed that a saving of 25 per cent. in fuel is possible.

As will be noted in the figure, the carcass of the tire is made up of a number of individual, long fiber cotton threads thoroughly impregnated with rubber under high pressure; these threads are then woven into a cord which is also impregnated with rubber. The finished cord is then woven over a form, in two layers, each layer of cord being separated by a layer of rubber. Every part of the cord is made and wound into the tire under equal tension by specially designed automatic machinery in such a manner that all internal strains are conveyed throughout, with no slack threads and no overworked parts. Every part of the tire carries its share of the load and all parts work together as a unit.

The cord tire costs about 25 per cent. more.

2—We do not quite understand what you mean by the gear ratio being stronger. There is little difference in the strength of the pinions and gears but this gear ratio will give the car greater speed but less hill-climbing ability.

This gear ratio will have to be made specially. Any first class machine shop should be able to do this work.

### Route from Bethlehem, Pa., to Boston

Editor THE AUTOMOBILE:—Will you please tell me what is the best road, scenery considered, from Bethlehem, Pa., to Boston, Mass

South Bethlehem, Pa. E. CIARLO.

—Probably the best way is through New York City. Drive through Easton, Clinton, Whitehouse, Bound Brook, Plainfield, East Orange, Newark, Hoboken to New York City. Then turn north, following Broadway to 207th street, then turn to right and cross the Harlem. Keep straight ahead until Fordham road is reached and follow this into Pelham Parkway, which is a continuation. Follow main road passing through New Rochelle, Larchmont, Mamaroneck, Rye, Portchester, Greenwich, Stamford, Darien, Norwalk, Westport, Southport, Fairfield, Bridgeport, Stratford, Milford, Woodmont, Savin Rock, New Haven, Meriden, Berlin, Hartford, Springfield, Palmer, Worcester, Marlboro, Waltham, Boston.

### How to Make a Keyway Quickly

Editor THE AUTOMOBILE:—So few mechanics, not to mention amateurs, know how to cut a keyway properly, that I believe it would be worth while to note these simple operations. After laying out the keyway, Fig. 5, with a scratch awl, rough out the keyway with a cold chisel which should be just a trifle narrower, in width, than the finished keyway. This can be done very quickly with a good sharp cold chisel. The angle at which the chisel should be held is indicated in the figure. The keyway is then finished with a sharp, square cornered file. The points to be most careful about are to file to uniform depth and to maintain a uniform width from one end to the other.

New York City. W. F. SCHAPHORST.

### Weight of Car Increases Tire Pressure

Editor THE AUTOMOBILE:—1—Is it easier to pump up a tire with the wheel jacked up when the weight of the car is resting on the wheel?

2—If a gauge shows a certain number of pounds with the wheel jacked up, will it show differently when the weight of the car is resting on the wheel?

Macon, Miss. M. H. HARRISON.

—1—Theoretically it is slightly easier to pump up a tire when the weight is removed but the difference is so small that it is doubtful whether any ordinary gauge would measure it. The extra work required represents the amount of work to lift the weight on that wheel through the distance that the inflated tire lifts the rim off of the ground, this distance being approximately 3 inches. But this is divided up among so many pump strokes that the extra work is not felt, and it is probably just as economical of energy to do it this way as to jack the wheel up.

2—When the weight of the car is placed on the fully in-

flated tire the pressure increases slightly, but not enough to register on the ordinary gauge. In considering what happens when the tire is let down off the jack it is well to keep in mind that under these conditions the pressure of the air in the tire at any time multiplied by the volume of the air in the tire at the same time is equal to a constant quantity. Therefore if the pressure in the tire when it was up on the jack was 70 pounds and the volume 1,000 cubic inches then when the tire is made to support its part of the weight of the car, the tire bulges slightly, Fig. 4, and this reduces to a slight extent the cross-sectional area of the tire at the bottom and therefore reduces the volume slightly, possibly not more than 1 cubic inch.

Since the volume has been reduced 1-1000 the pressure will be increased the same amount or to 70.07 pounds.

## Definition of Piston Displacement

Editor THE AUTOMOBILE:—1—Please explain in your next issue what piston displacement is, how to measure it and

2—What is the displacement of the Chalmers 30?

St. Louis, Mo. A. F. K.

—1—Piston displacement means the actual number of cubic inches displayed by the movement of all the pistons from one end of the stroke to the other. Considering just one piston, it equals the area of the piston head in square inches multiplied by the length of the stroke in inches, and in a four-cylinder motor, for instance, the total displacement would be four times this amount.

The area of the piston head is equal to the bore of the cylinder squared and then multiplied by .7854 and the volume is then given by multiplying this by the stroke. This gives the displacement of one cylinder, and therefore to get the total displacement, it is necessary to multiply by the number of cylinders.

Expressed as a formula:

Piston displacement $=$ bore$^2 \times .7854 \times$ stroke $\times$ number of cylinders.

2—The dimensions of this motor are 4 by 4.5 inches and applying the above formula, we have,

Piston Displacement $= 4^2 \times .7854 \times 4.5 \times 4 = 228$

## Spark Retarded May Heat Motor

Editor THE AUTOMOBILE:—It has been suggested to me by a reader of your publication to write regarding the heating of my automobile engine. It seems that the motor heats too much and that the thermo-syphon system does not do its work properly or that the heating is caused by another source. I believe my carbureter is adjusted properly, there is no slipping fan belt or loss of compression, but still the engine overheats. As the car has not been run over 3,000 miles, I doubt as to whether carbon could be the cause.

W. F. DEHNERT.
Newark, N. J.

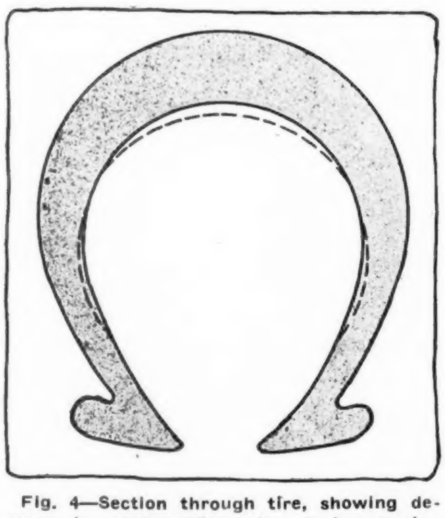


Fig. 4—Section through tire, showing decrease in cross-section when it is carrying the weight of the car

—It is most likely that your trouble is due to driving with the spark retarded too far, although it is impossible to say with certainty that this is so.

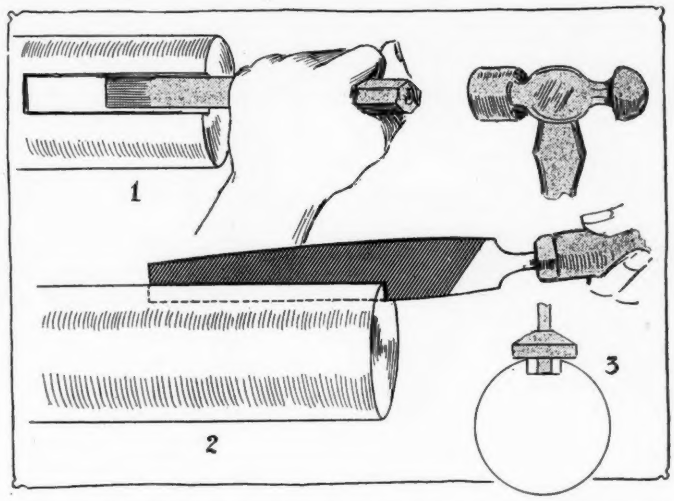



Fig. 5—(1) Method of cutting keyway. (2) Filing it smooth. (3) Measuring depth of keyway

Try driving your car with the spark advanced as far as possible, at all times, without the motor knocking.

There are many other things that might cause your motor to overheat, however; carbonized cylinders, poor water circulation, incorrect timing of motor, dragging brakes or possibly excessive friction. Just as you state, it is not likely that the trouble is caused by carbon but in looking for the cause it is not wise to neglect this possibility for the reason that motor troubles are often caused by the most unexpected circumstances.

Note whether the water is circulating freely, and if not, try to find where the trouble is, whether it is due to dirt, loose pieces of rubber obstructing the passages or what not.

Remember that with a thermo-syphon system, the water will not circulate at all as soon as the level drops below the discharge header in the top of the radiator. Circulation of water in the thermo-syphon system is dependent on the fact that the column of water, considered as such for simplicity, in the pipes and water jackets, is lighter than the column in the radiator because it is warmer and water expands and grows lighter as it is warmed. Therefore, if the level of water drops below the outlet pipe, circulation must stop. Consequently it would be well to note whether you have not been running with the water below this point. Or it is possible that you have a slow leak and that in the course of an afternoon enough water leaks out to lower the level enough to stop the circulation, as described.

If there is dirt in the radiator flush it out thoroughly and if there is any grease in the water wash it with a hot solution of sodium carbonate in water, one handful of carbonate to a pail of water will be sufficient. See that the rubber hose connections are in good condition.

As a last resort, check up the valve-timing by the marks on the flywheel and if there are no marks you had better write to the maker for information on this point.

You do not say whether your water boils or not although it is generally understood that this occurs whenever it is stated that a motor overheats but from your description it seems possible that, while the motor and especially the radiator becomes very hot to the touch, no boiling and therefore, no actual damage occurs, no loss of power is noted and there is no difference in the action of the motor or the performance of the car. If this is the case, there is nothing to worry about. A gasoline motor is designed to operate with the water very near the boiling point, or in other words at about 180 degrees Fahrenheit and although this temperature seems hot to the touch, it does not harm the motor.

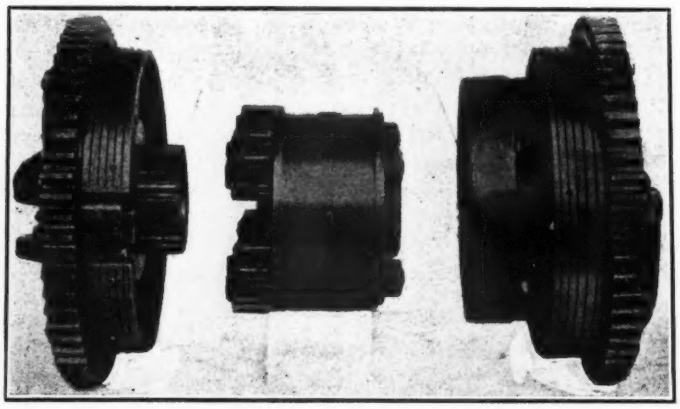
You have given no symptoms of overheating but merely stated that the motor "heats too much" and if the motor does not lose power or knock, there is nothing the matter.

# The Engineering Digest

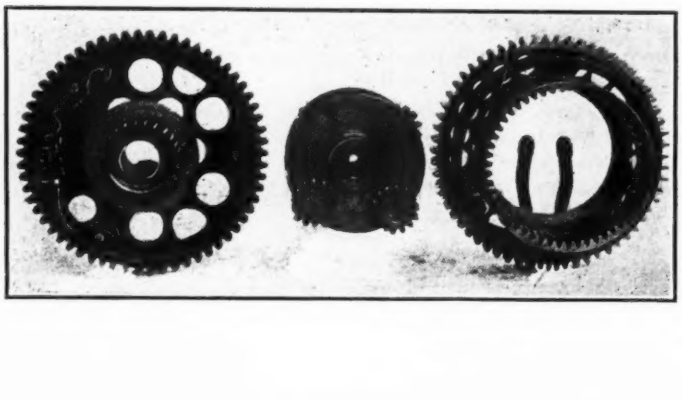
## Worm Drive with Planetary Three-Speed Gear Forming a Rear Axle Unit—Tested Several Years

TWO difficulties stand against the adoption of a planetary change-gear for automobiles; first, that the sliding-gear has become almost universally adopted for cars requiring more than two gear-speeds ahead and, secondly, that the arrangement of three or four gear ratios so proportioned that the motor can be utilized fully on all of them is found difficult to make, because the sizes of the planetary gear wheels are somewhat interdependent while the peculiarities in the meshing of an internal gear also limit the choice of dimensions. A third difficulty arises if it is desired to place a planetary gear on the rear axle, as its weight is considerable and forms an unwelcome addition to the unsprung mass of the running-gear of the vehicle. Nevertheless a planetary gear with three forward speeds and reverse has been in operation in several hundreds of cars turned out during the past seven years by Chambers Motors, Ltd., of Belfast, Ireland, and for the past five years it has been located on the rear axle, forming a construction unit with a worm drive and the differential.

With a view to the revision of standard construction data which is now taking place all over in order to exploit all possibilities for building very light cars and cyclecars at a low cost of production, and also with an eye to the simplification, improvement and cheapening of trucks and delivery wagons, the Chambers planetary gear and the substantial details of its construction have become matters of timely interest, rather enhanced by the length of time it has been in practical use, and *Engineering* (London) gives an elaborate description of the latest model, from which the following abbreviated account and illustrations are taken.



Figs. 1 and 2—Two gear-speed members of Chambers gear and differential box with planet pinions



### Change Gear Between Vehicle Wheels and Worm

In the general design it is first notable that the change-speed gear comes behind the worm gear in the order of power transmission, so that the speed and driving-pressures of the latter remain unaffected by gear changes. The drive is transmitted from the worm wheel to the drum upon which this wheel is mounted and from this drum through expansion rings to one or the other of the two speed-gear members, one of which comprises the internal-gear ring and the other the central sun gear, and from either of these gears the differential box is driven through the planetary pinions; the wheel shafts finally are driven from the differential box in the usual manner.

Figs. 1 and 2 show the two speed members with their expansion rings and the differential box with the planetary pinions, while the mechanical means employed for assembling these parts within the worm wheel drum and the outer drum, as well as the control parts and the external reverse gear pinions, are distinguishable in the line drawings, Figs. 3 to 7. The grooved pulley-like parts shown in Fig. 1 are actually the outer surfaces of the expansible friction rings, which lie inside the outer drum carrying the worm wheel and are marked *b* in Fig. 5. These friction rings may be expanded either separately or together, this giving the three gear combinations, of which the one caused by clutching both rings is the direct drive. The external teeth on the speed members, which makes them look like large spurwheels, have no share in forward propulsion but come into action for the control of the friction rings and for the operation of the reverse. The drum carrying the worm wheel is for the sake of clearness shown double-cross-hatched in the line drawings. When one speed member is clutched, the other is locked automatically by means of a pivoted catch, referred to later, and on direct drive this special locking mechanism is out of action.

### The Gear Ratio

For the first speed, the speed member with the internal gear, and marked *c* in Figs. 3 and 5, is locked, while the friction band of the member with the sun gear, marked *d*, is expanded and driven by the worm gear. For the second speed this is reversed, *d* being locked while *c* is driven.

It is this mutuality in the gear arrangements which is generally resorted to in planetary gears in order to get two different speeds without too many parts and which in turn makes it difficult to get the proportions in the gear ratios what they should be. But with as much effort expended upon planetary gears as has been devoted to sliding-gears this drawback may perhaps be circumvented.

In the present instance the sun wheel has 24 teeth, the internal wheel 52 teeth and each of the planets 14 teeth. These proportions give driving speeds for the vehicle of about 8, 17.5 and 26 miles per hour with the motor running at 1,100 revolutions per minute and the proportions of the worm drive such as they are in the Chambers car. The gear ratios apart from the worm drive may be figured as follows: With the first speed in action, the internal gear is locked, as mentioned, and the sun gear *d* drives the plane-

tary pinions *e*. One revolution of the internal gear now in the first place produces one revolution of the sun gear by turning the four planetary pinions, as a unit, once around, the sun gear following, and secondly the revolution of the pinions on their own axes causes an additional revolution of the sun wheel determined by the number of teeth, 52 in the internal gear and 24 in the sun wheel, so that the total rotation of the sun wheel becomes 1 plus 52/24 revolutions, making 3.16 revolutions. As one revolution of the internal gear on the first speed is also one revolution of the vehicle wheels, the gear ratio on this speed is thus 3.16. The ratio for the second speed, when it is the sun wheel which drives, becomes by similar reasoning 1 plus 24/52, which is 1.4615. The third speed, being direct, is of course unity, both the internal and the sun gear driving the pinions but in opposite directions, so that they cannot revolve on their axes.

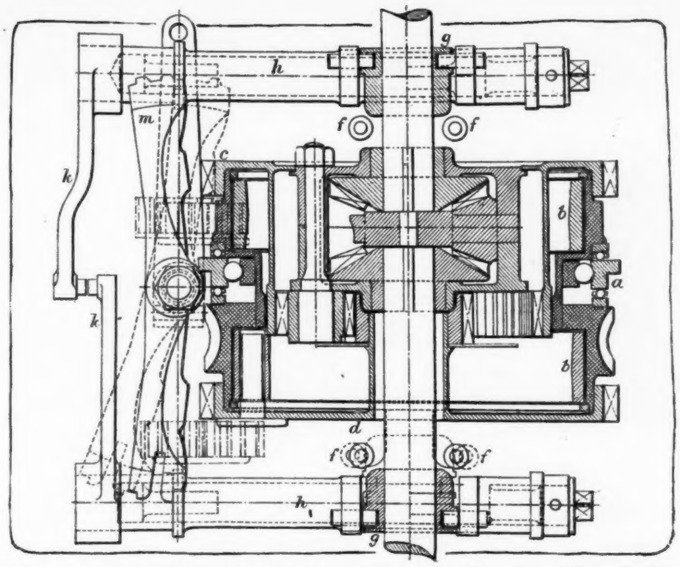


Fig. 5—Horizontal section; locking bar in position for either direct drive or reverse, being out of action

### Operation and Control

The operating mechanism is perhaps the most interesting part of the Chambers gear. Each of the expansion rings, Fig. 6, is operated by means of a forked and rotatable clutch lever formed of two similar parts, the ends of which are shaped to carry rollers *f* and straddle the car axle without touching it. The formation of each part is shown to the right of the friction ring, Fig. 6. The friction rings are expanded when the free ends of the clutch levers are forced apart by a collar which slides on the central wheel shaft, as shown at *g* in Fig. 5, and the collars—one on each side of the mechanism—are controlled by two hollow rocking-shafts shown at *h* in Figs. 3 and 5. Each rocking-shaft has two upward-projecting arms which form a fork between the prongs of which the collar rotates, and pins with flat elongated heads are carried by the arms and serve to move the collar along the shaft. Levers shown at *k* in Figs. 3 and 5 and separately in Fig. 7 are pinned to the hollow shafts and these are connected to the pedals in front of the driver, so that he can move either or both collars. The motion of the rocking-shafts is spring-controlled, the foot pressure forcing them outward against the spring tension. The springs are inside of the hollow shafts, as shown in dotted lines in Fig. 3 and are arranged to be adjusted without dismantling the gear.

The details of the connection between the prongs of the clutch levers and the friction rings are worked out elaborately and are shown in Fig. 8 ou a large scale. The parts marked *f* are here the ends of the clutch levers. Each of these prongs is formed with a rocking-edge *l* on its inner face and a feather *r* on its outer, the feather fitting into a groove in the friction ring. The groove is lined with a hard steel seating. Between the two prongs there is a distance-piece made up of three parts, the inner one of which is wedge-shaped, and this distance-piece forms an adjustment for the friction ring; by slacking the wedge or tightening it the diameter of the ring is altered. The expansion necessary for clutching one of the speed members is obtained, as already explained, by rocking the prongs by means of the collar which forces apart the other ends of the lever arms. By this operation the feathers on the outer sides of the prongs are moved slightly upward and carry the ends of the friction bands with them. The whole arrangement is held together by the flanges on the distance-piece, the pins through the clutch levers and the inward spring of the ring, and the clutch levers are in no

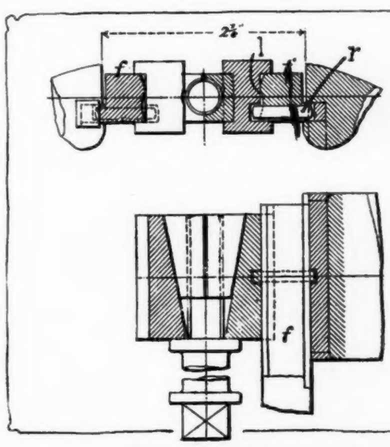
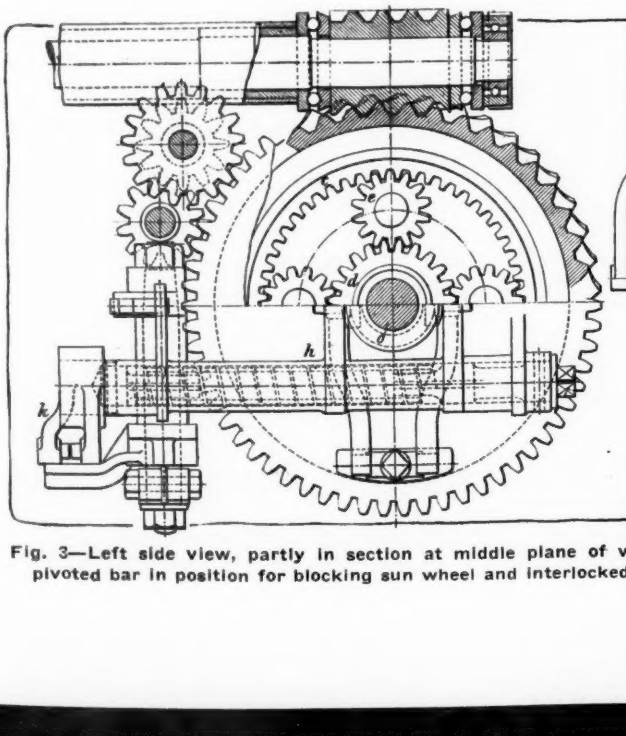


Fig. 8—Detail of clutch operation



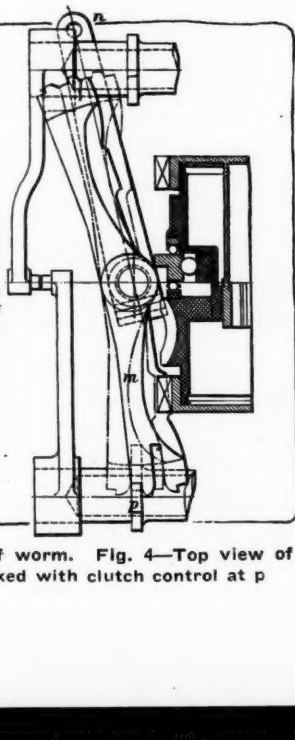


Fig. 3—Left side view, partly in section at middle plane of worm. Fig. 4—Top view of pivoted bar in position for blocking sun wheel and interlocked with clutch control at p

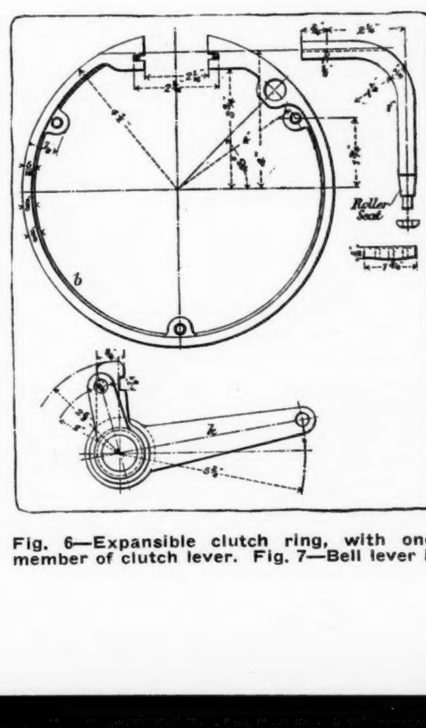


Fig. 6—Expansible clutch ring, with one member of clutch lever. Fig. 7—Bell lever k

other way secured to any part of the whole mechanism.

**Locking of the Idle Speed Member**

To lock the non-working speed member, while the other drives, the pivoted bar shown at *m* in Figs. 4 and 5 is provided. The range of motion of the bar is indicated in Fig. 4, the opposite motion being equal in extent. It locks by engaging with the outside teeth of the speed member. The bar is moved by lever *n*, Fig. 4, which is connected to the hand gear and it is interlocked with the mechanism for operating the collar *g* by catches on the rocking-shafts *h*, the catches engaging with the stepped ends of the bar, as at *p*.

**The Reverse Gear and the Casing**

To reverse the direction of the drive, a gear of the sliding type is employed, composed of spurwheels engaging on the outside of the speed members; see Fig. 3. When it is in mesh, the sun wheel drives from the outer worm wheel drum and the internal gear wheel is revolved backwards. The locking bar is out of action. The train of pinions for reverse is proportioned so that the internal gear makes one revolution for every 1.5 reverse turn of the sun wheel.

The whole mechanism is enclosed in an aluminum casing to which are secured the hollow fixed axles inside of which the wheel-driving shafts float, and the radial and thrust ball-bearings for the drive shaft as well as the very large ball-bearing for the worm wheel are mounted directly in this casing. A ridge is formed upon the outer fixed member of this bearing and fits into a corresponding groove in the aluminum while also acting as part of the two ball thrust-bearings taking the end pressure of the worm drive.

# Rules for Hotelmen Who Want to Hold Motor Tourist Trade

FRENCHMEN do not like to tour outside of their own country, as a rule, but they admit that the hotels in out-of-the-way places in Switzerland and Holland give more acceptable accommodations than those to be found in some of the French provinces. The "*Club des Cent*" is an exclusive association, recruited from those prominent in art, politics and commerce, which has for one of its purposes to guide French hotelmen to a better understanding of the requirements for securing the best tourist trade. Each member must have driven his own car at least 40,000 kilometers, and all are constituted "overseers of the roads" and report on their condition. At the club there is a book in which the members write their reflections and their desires, and it is now the intention to have some of these remarks printed on cards and sent to hotelmen, to be posted in their private offices, and as folders for general distribution

Among the remarks in the club book bearing on the hotel question the following give an idea of the movement. They are largely in the form of mottos:

**To Hotelmen**

"Cleanliness, sane nourishment, fresh beds; luxury afterwards."

"Make us pay the price of things; we want you to earn a generous living; but we refuse absolutely to be gouged."

"No special affection for the 'Majestic Palace' or for mahogany barracks: as a rule, the larger the hotel, the more its kitchen flirts with chemistry."

"In a hotel you find often a good landlord, seldom a good manager."

"The club favors especially the good little hotels, the good little inns managed by their owners."

"In a good hotel one is received by the landlord."

"We eat beefsteak, not Louis XV armchairs."

**The French Kitchen**

"Good French cooking is done with fresh ingredients: fresh greens, fresh eggs, fresh butter, fresh milk."

"Let the salt be served in closed shakers, the pepper likewise; no dry mustard on the edge of the container."

"A good hotel is known by its coffee; no chicory! Coffee is made slowly with boiling water. Any coffee made in advance is poor coffee."

"Sugar bowls with covers; biscuits in closed boxes; cheese under cheesebells. Feed your guests, not the flies."

"The French kitchen ignores the soups bought in bottles or tins at the grocer."

"Down with gelatine! Down with fish glue! Any jelly made with gelatine is a nest for microbes. No chemical extracts! no sauces turned out at food factories! We admit no other kitchen than the kitchen."

"The great kitchen is not always the good kitchen. Down with the schools of cookery invented in countries where they don't know how to eat."

"Buy good wine. Having bought it, learn how to keep it. The hotelman who does not keep a few select bottles in his cellar cupboard is only a hashhouse keeper."

**The Personnel**

"Get your help in your own country: The Club of the Hundred refuses to stop with hotelmen who employ people with bizarre accents; Swiss in Switzerland, Italians in Italy, French in France."

"You little hotelkeepers, don't degrade your waiters with soiled clothing; any garment is good if it is clean."

"White linen, washed hands and combed women."

"A chauffeur should eat at the same time as his employers; he should be received as well as they are."

**Rooms**

"Clean, light rooms, large and comfortable bed, plenty of water."

"Buy everything in your own section of the country; Britton crockery and furniture in Brittany, Normandic furniture in Normandy; be at home; save the local color. Down with the products of the international market!"

# New System for Swimming Pool at French Club

WHEN the Automobile Club of France built a new swimming pool at the clubhouse it also adopted a new system for keeping it clean and fresh. It is described at length in *Construction Moderne* of March 8 by Mr. Couturaud.

The principle for the installation is to make the same water circulate constantly; from the pool to the filters, the sterilized apparatus operating with ultraviolet rays, the reheater, the circulation pump and back to the pool. The reheater does not receive all the water in circulation but only a fraction adjusted according to the temperature to be obtained. The degree of heating produced by the apparatus remains constant.

The dimensions of the pool are about 25 by 9 meters with a useful depth of 3½ meters. It is built of armored concrete on the level of the street, and the machinery is in the subbasement.

The water can be driven by the pump either into the sewer or to one of two sand filters. These filters are cleaned from time to time by means of a counter-current of clean water which carries away the impurities, the sand being churned up at the same time with rake-like instruments.

The sterilizer, which acts upon the water after it has been filtered, consists of a mercury vapor lamp with quartz bulb around which the water circulates.—From *Génie Civil*, June 20.

# Metropolitan S. A. E. Discusses Headlights

NEW YORK CITY, July 3—At a meeting of the metropolitan section of the Society of Automobile Engineers, held at the Automobile Club of America last night, the subject of non-glaring headlights was taken up. All the known manufacturers of devices for eliminating the glare from headlights were invited to demonstrate their devices before the metropolitan engineers and seven responded. These were as follows:

1—Legalight Mfg. Co., New York City.
2—Glare Breaker Co., Pittsfield, Mass.
3—C. and A. Matisse, New York City.
4—Pittsburgh Electric Specialties Co., Pittsburgh, Pa.
5—Ward Leonard Co., Bronxville, N. Y.
6—Corning Glass Works, Corning, N. Y.
7—H. W. Johns-Manville Co., New York City.

### Legalight

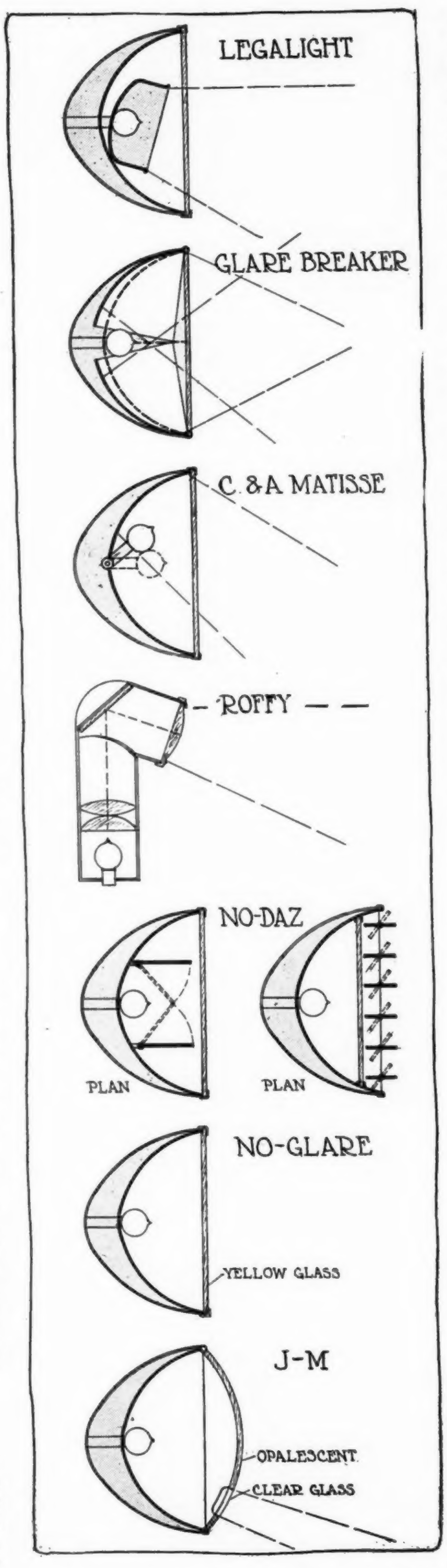
The Legalight was described by Joseph Gries. It consists of a small reflector which can be clamped over the bulb by a simple attaching device whenever it is desired to have the lights subdued. The Legalight deflects the rays 15 degrees from the horizontal so that the light falls on the ground in front of the car. At this angle the axes of the light cones are thrown on the road 3.73 feet in front of the car for every foot of height of the lamps. That is, if the lamp is 3 feet above the ground, the center of the stream of light would strike the ground 11.19 feet ahead of the car, illuminating the path ahead. The small reflector is deeply cupped as it was found that if the cup were not deep enough some of the rays would get into the main reflector and would be thrown straight ahead, giving the dazzling effect.

### Glare Breaker

The Glare Breaker, as described by J. G. Middleton, of Pittsfield, Mass., is a device which splits the reflector of the lamp exactly across the center. This destroys the parabola and instead of the beams being thrown straight ahead they are deflected downward in front of the car and upward at an angle which is sufficiently acute to remove any danger of the rays striking the eyes of pedestrians or of occupants of oncoming cars. The rays which are thrown from the upper part of the split reflector strike the ground in front of the car and serve to illuminate the road ahead. The device is controlled from the seat of the car and can be operated when another car approaches or whenever it is desired to break the headlight rays by pressing a button which controls a solenoid coil.

### C. & A. Matisse

Norman Macbeth, exhibitor of the C. and A. Matisse, in lecturing on the headlight situation, spoke of the cause of glare as being the filling of the retina of the eye with the rays of light. That is, when the retina is filled by a large volume of light, the blinding effect is given. The C. and A. Matisse is a device which can be controlled from the seat and consists simply in a means for removing the lamp bulb from the focal point of the parabola. The bulb socket is pivoted and when it is desired to cut down the direct rays in order to eliminate the glare, the bulb is tilted upward out of focus. This immediately annihilates the effects of the parabolic reflector and the rays are scattered instead of thrown forward in a direct dazzling beam.




Illustrating the seven types of headlight glare-removing devices exhibited to Metropolitan Section of S. A. E. at the Automobile Club of America.

### Roffy Achromatic

The principles of the Roffy achromatic lamp were explained by J. G. Roffy. The glare-eliminating properties of these lights are due to the inclination of the axis of the light cone so that the uppermost rays are parallel to the ground. According to Mr. Roffy, the best arrangement is to have this ray at a height of 4.5 feet. This would eliminate the possibility of the blinding of either a pedestrian or occupant of another car by the light. The sectional illustration shows the arrangement of the lenses within the lamp, the light being deflected ahead by a diagonal mirror. Immediately above the high-candlepower bulb there is a plano-convex lens that concentrates the light and throws it into the double lens above it. From this lens the light is thrown against the mirror and thence through the projecting lens in front which neutralizes the color distortions produced by the condensing lens. In connection with this lamp there is a series-parallel switch which cuts in half the amperage when thrown into series.

### No-Daz

Leonard Kebler, president of the Ward Leonard Company, described two devices that are made under the name of No-Daz. The first of these has a pair of translucent wings fastened inside the reflector. These wings project forward from the reflector in ordinary running, but when it is desired to dim the lights they fold tightly across the face of the reflector, imprisoning the light within. In the second scheme there is an arrangement at the front of the lamp similar to the ordinary shutter on a window. In ordinary running the shutters stand horizontally with the light shining between their faces. As the edges of the shutters are very thin, but little light is absorbed by them. When a button is pressed from the driver's seat the shutters are closed and the glare removed.

### No-Glare Glass

The No-Glare glass made by the Corning Glass works was described by Dr. Wm. Churchill. The doctor was the first one to take up the non-blinding headlight from a physiological rather than a mechanical standpoint. He stated that the glare was caused mostly by the presence of rays near the violet end of the spectrum and that the rays at the red end of the spectrum do not materially affect the eye. "The glare is most," he said, "when the intrinsic brilliancy is highest." He then went on

(Continued on page 95)

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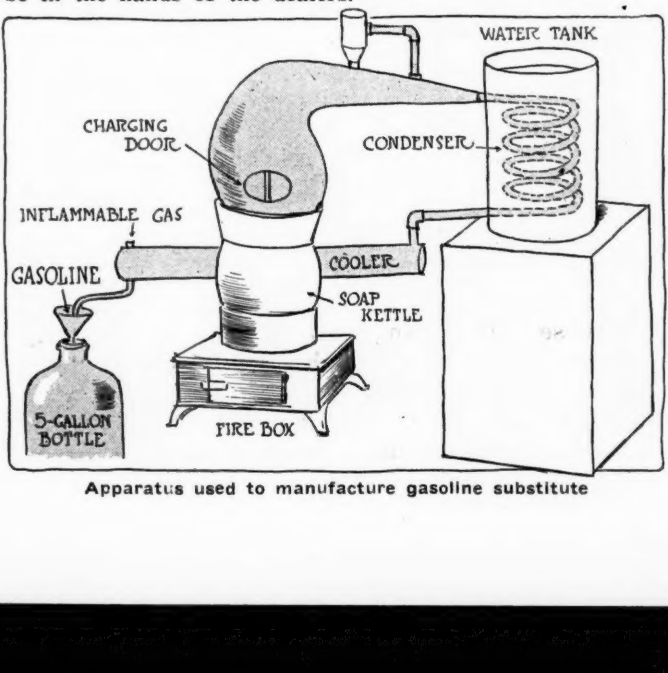
John Andrews is a Portuguese-American, born on the Maderia Islands, and living in McKeesport, Pa., and owing allegiance to King Manuel. Formerly a sailor and then a worker in the steel mills of Pittsburgh, where he selected the most dangerous work where he could get the highest pay wherewith to carry on his experiments. Recently, he received $350,000 from the United States government for the patent right to a new steel armor plate which he invented and with which the battleship Pennsylvania is being covered.

### Dodge Bros. Incorporate for $5,000,000

DETROIT, MICH., July 8—*Special Telegram*—Dodge Bros. have incorporated, capital stock being $5,000,000. John F. Dodge is president and treasurer, Horace E. Dodge vice-president and general manager and Alfred L. McMeans secretary and office manager. The two brothers hold equal amount of stock, giving them full control, while McMeans holds balance. "No announcement about our new car will be made for at least 2 months," said G. C. Hubbs of Dodge Bros., "and when this announcement is made Dodge cars will be in the hands of the dealers."

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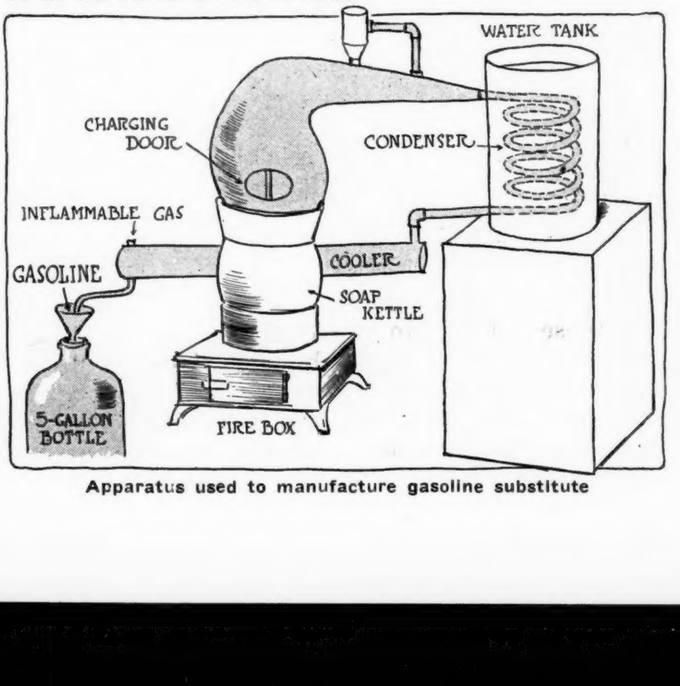
One of the features of the process is the fact that the gravity test of the product can be made whatever desired, simply by altering the proportions of the chemicals. That is, Andrews can obtain at will gasoline of any gravity between 50 and 90 degrees Baumé. At present he cannot hit the desired gravity test by a few degrees on account of the crude apparatus and seemingly haphazard way in which he guesses at the quantity of ingredients.

John Andrews is a Portuguese-American, born on the Maderia Islands, and living in McKeesport, Pa., and owing allegiance to King Manuel. Formerly a sailor and then a worker in the steel mills of Pittsburgh, where he selected the most dangerous work where he could get the highest pay wherewith to carry on his experiments. Recently, he received $350,000 from the United States government for the patent right to a new steel armor plate which he invented and with which the battleship Pennsylvania is being covered.

### Dodge Bros. Incorporate for $5,000,000

DETROIT, MICH., July 8—*Special Telegram*—Dodge Bros. have incorporated, capital stock being $5,000,000. John F. Dodge is president and treasurer, Horace E. Dodge vice-president and general manager and Alfred L. McMeans secretary and office manager. The two brothers hold equal amount of stock, giving them full control, while McMeans holds balance. "No announcement about our new car will be made for at least 2 months," said G. C. Hubbs of Dodge Bros., "and when this announcement is made Dodge cars will be in the hands of the dealers."




Apparatus used to manufacture gasoline substitute

# N. Y. Workmen's Compensation Law in Effect

## Motor Car Manufacturers and Employers in Allied Industries Now Compelled to Indemnify Employees from Results of Accidents—Employer Is Compelled to Insure

NEW YORK CITY, July 1—The Workmen's Compensation Law, which went into effect in New York state today virtually supersedes the old Employer's Liability Law and, to a certain extent, the common law defense as well.

It applies to 47 groups of what are styled "hazardous" employments. These include more than 1,000 occupations. The various groups of so-called hazardous employments include practically all manufactures in the motor car and allied industries. They also include operators of garages and repair-shops, as well as motor car dealers.

The law states specifically that it shall apply to every hazardous employment where the workman is employed "for the pecuniary gain of the employer." This new law differs from the old common law in that it makes an employer responsible for injuries to his workmen whether or not the master is at fault; also, the old common law plea of contributory negligence on the part of a fellow workman is eliminated. In other words, it provides that every workman employed in any one of the so-called hazardous classes who is injured must receive a stated compensation.

### EMPLOYEE MUST ACCEPT

The employer is compelled to provide this compensation; the employee cannot refuse to accept it. Agreements between the employer and the employee to waive any such compensation cannot be made, nor can the employer compel the workman to help pay premiums.

At the same time, the law takes away from workmen any and all right to sue under the common law for alleged damages. It also relieves the employer of the responsibility of such suits, but the employer must provide for compensation to his workmen; the law is virtually compulsory in this respect.

The entire burden falls upon the employer, and whereas under the old common law the workman was required to prove negligence on the part of the employer in order to recover for injuries received, the new law assumes—in the absence of substantial evidence to the contrary—that (1) The claim comes within the law; (2) That sufficient notice was given; (3) That the injury was not willfully intended; (4) That the injury did not result solely from intoxication while on duty.

If the employer fails to pay compensation within 10 days subsequent to the time when it is due he is subject to a suit by the state commission, which may declare the entire compensation recoverable in a lump sum with a penalty of 50 per cent. in addition. Such due payments constitute a liquidated claim for damages against the employer or the insurance carrier.

### EMPLOYER MAY BE PENALIZED

If any employer fails to comply with the law by adequately providing for compensation to his workmen, the law states that "he shall be liable to a penalty for every day during which such failure continues of $1 for every employee, to be recovered by an action brought by the commission." The commission may, however, at its discretion, remit such penalty provided the employer secures proper compensation.

### EMPLOYER COMPELLED TO INSURE

As already has been stated, the law is intended to insure compensation to those workmen whose labors come within the 47 groups that the commission has adjudged to be hazardous. Of these 47 groups there are probably seven that apply directly or indirectly to the motor car industry insofar as the dealer, garagemen and the repair-shop operator are concerned. These seven groups are as follows:

Group 4. The operation, including construction and repair, of machine shops, etc.

Group 16. Manufacture of furniture, upholstery, etc.

Group 21. Iron, steel or metal foundries, rolling mills, manufacture of castings, forgings, heavy engines, locomotives, shafting, wires, tubing, pipes, sheet metal.

Group 23. Manufacture of small castings or forgings, metal wares, instruments, water, gas or electric fixtures; light machines.

Group 24. Manufacture of traction engines, vehicles, automobiles, motor trucks, etc.

Group 25. Manufacture of explosives and dangerous chemicals, gasoline, petroleum, petroleum products.

Group 41. The operation, or otherwise than on tracks, on street highways or elsewhere, of cars, trucks, wagons or other vehicles, and rollers and engines propelled by steam, gas, gasoline, electricity, or mechanical means.

Group 41 covers very broadly the operation of motor cars and commercial vehicles, but in this respect it should be pointed out that the law states specifically that compensation shall be paid only to those who are employed for the pecuniary gain of the employer. This makes it plain that chauffeurs who drive private cars, for instance, do not come within the law inasmuch as they are not employed for the pecuniary gain of their employers.

The operation of repair-shops is quite clearly covered by Group 4 and this group may also be construed to cover the operation of garages.

The employer is compelled to provide compensation for those of his workmen whose occupations come within any of the 47 groups. He is compelled to give evidence that the compensation will be paid by insuring its payment. This may be had in one of four ways:

He may insure with the State Fund which is created under the new law for the purpose; with a mutual insurance company; with one of the many stock companies; or he may carry the insurance himself. It is not likely, however, that many employers will care to insure themselves; only men of unquestioned financial ability will be permitted to do so. Furthermore, "the commission may, in its discretion, require the deposit with the commission of securities of the amount prescribed in Section 13 of the insurance law in an amount to be determined by the commission to secure his liability to pay the compensation provided * * *" This security must remain until the liability for compensation ceases, which may be for 50 years or more.

### COST OF METHODS EQUAL

There remain, therefore, but three ways in which the average employer can insure the payment of compensation. Each method has its advantages and its disadvantages. The cost of each method to the employer will be approximately the same. If the employer insures with the state fund, he is automatically relieved of all further liability for compensation. If, on the other hand, he insures with either a mutual company or a stock company, he is not relieved of all liability, for if the "insurance carrier," which means the company with which he insures, should fail, the employer would still be liable for compensation which might go on for an indefinite term of years—50 or more. As a measure of comfort, it may be added that such companies do not often fail. However, this slight hazard exists and it should not be overlooked, for only by insuring in the State Fund can the employer be relieved of all future liability.

If the employer insures with a stock company he will be required to pay a specified semi-annual premium based upon the amount of his payroll. This premium will never vary except as the payroll varies.

The premium which will be required by mutual companies, however, may vary. In other words, there may be assessments in addition to the premium. If, for instance, there should be a terrible catastrophe which would levy so heavily on the resources of the mutual company that an insufficient amount was available for the payment of all compensation, it would then be within the power—it would also be the duty—of the officers of the company to make an assessment upon each of the individual insurers to make up the difference.

### STATE FUND HAS TWO ADVANTAGES

The advantages of insuring in the State Fund are claimed to be two in number. These are:

1. The employer who insures in this way extinguishes his liability to pay compensation, and
2. That the expense of managing the fund—not the claims for compensation, however—will be paid by the state for a time. [Two and one-half years.—Ed.]

Those who insure in the stock companies, on the other hand, will be liable for no extra assessments. Those who elect to insure their compensation in a mutual company virtually insure themselves; they become partners in a company which carries the insurance. The advantages of this form of insurance are claimed to be

1. Less expense, in that agents are eliminated;
2. Possibility of dividends in case the premiums should be slightly too high at first due to lack of experience;
3. Ability to insure against employers' liability under the common law and to reject undesirable risks.

In this respect it should be pointed out that whereas both mutual companies and stock companies have the privilege of rejecting undesirable risks in the same way that life insurance companies will refuse to write insurance on the life of a sick man; the State Fund has no such privilege; it must take all those who apply for insurance. It has the privilege of making its rates so high that they are prohibitive, however.

The cost of workmen's compensation insurance by two of these three methods is exactly the same. The rates quoted by the stock companies and those quoted by the mutual companies do not differ. The rates quoted by the State Fund, however, are exactly 8 per cent. less than those of the insurance companies.

In every case the premium rates are based upon the total payroll, the premiums applying to each $100 of wages or salaries. The rates charged by both mutual and stock companies for electric motor car dealers, either with or without garage, is 97 cents per $100 of payroll per year. For dealers in gasoline cars, either

with or without a garage, the rate is $1.36. The rates charged by the State Fund on the same risks are 89 cents and $1.25, respectively.

These rates apply on the entire payroll, including such executive officers whose duties may expose them to the operative hazard of the business. The salaries of these officers is only included up to $1,500 a year, however.

The premium charged by the stock and mutual companies on machine shops which have a foundry is $2.07 per $100 of payroll per year. Where there is no foundry the premium is $1.36. The State Fund rates are $1.90 and $1.25, respectively.

The premium for a chauffeur driving a car for the pecuniary gain of his employer under the stock and mutual rates is $2.43 per $100 of payroll per year. The State Fund is 8 per cent. less. In neither case, however, can the total premium be less than $15 a year.

In connection with these rates, it should be remembered that under certain conditions reductions of as much as 40 per cent. may be made. Working together, the stock and mutual companies and the State Fund have created an inspection bureau. It will be one of the duties of this bureau to inspect the premises and to order reductions in rates in accordance with the condition of the premises. In other words, a machine-shop, for instance, which is in poor condition and where open gears, unprotected belting, unprotected stairways, etc., are rule rather than the exception, will pay the maximum rate; but where an earnest effort has been made to reduce the hazard under which the workmen operate, reduction in rates will be made accordingly.

What does the employee get under any of these forms of insurance? For the first two weeks subsequent to his injury he gets nothing, but the employer is required to furnish medical or surgical treatment for the first 60 days. During this period of the workman's disability the law states that the employer must furnish "such medical, surgical or other attendance or treatment, nurse and hospital service, medicine, crutches and apparatus as may be required or may be requested by the employee during 60 days after the injury."

The compensation due the workman is based upon his average weekly wage. This is obtained by multiplying his daily wage by 300 and dividing the product by 52. For total permanent disability, the workman will receive 66 2/3 per cent. of his average weekly wage during the continuance of his disability.

Suppose, for instance, the case of a man 21 years old, earning $22.50 a week. If he is permanently totally disabled he will receive $15 a week as long as he lives; there is no limit to the amount of payment. If he lives 40 years, he receives $31,200; if he lives 50 years, he receives $39,000.

For total temporary disability, this same workman will receive $15 a week during the continuance of his disability until he has received a total of $3,500; for partial temporary disability he will receive $15 a week for varying lengths of time, depending upon the extent of his injury, the schedule being as follows:

| Loss of | Weeks | Payment |
|---|---|---|
| Thumb | 60 | $900 |
| First finger | 46 | 690 |
| Second finger | 30 | 450 |
| Third finger | 25 | 375 |
| Fourth finger | 15 | 225 |
| Great toe | 38 | 570 |
| Any other toe | 16 | 240 |

(Note.—The minimum limit of weekly compensation is $5. In other words, if the workman is receiving but $5 a week the compensation will amount to his regular wage; the maximum limit of weekly compensation is $15 a week.)

| Loss of | Weeks | Total Payment |
|---|---|---|
| Hand | 244 | $3,660 |
| Arm | 312 | 4,680 |
| Foot | 205 | 2,075 |
| Leg | 288 | 4,320 |
| Eye | 128 | 1,920 |

(Note.—The minimum weekly compensation is $5 and the maximum in this case is $20 per week.)

In all other cases the rate of compensation will be 66 2/3 per cent. of the average weekly loss of wages payable during the continuance. In such cases there is no limit to the amount which may be paid.

## Driggs-Seabury Gets U. S. Truck Order

NEW YORK CITY, July 6.—The Driggs-Seabury Ordnance Corp., Sharon, Pa., maker of the Vulcan truck, has entered into contract with the U. S. Government to supply 2 and 3-ton trucks during the fiscal year, starting July 1. The estimated number of trucks to be required is between 100 and 120.

# 3,732,585 Sq. Ft. in Ford Plant After Expansion of 10 Years

## In Decade Buildings Now Under Way Will Occupy 85 Acres and House 40,000 Workers

DETROIT, MICH., July 6—Within the next 5 years the Ford Motor Company's plant at Highland Park, Detroit, is to be gradually enlarged so that in 1919 it will have a total floor space of 3,732,585 square feet or cover a piece of ground of 85 acres. At present the plant occupies 45 acres, has room to employ 20,000 men but when the buildings that have been planned are completed the Ford organization will be able to give employment to 40,000 men.

Two buildings 900 feet long, 60 feet wide and 6 stories high costing about $500,000 each were started last year and are now almost completed. Five buildings entirely similar to these, are to be erected within the next 5 years. Like the two nearly finished they will be of concrete with steel columns and rafters supporting the upper floors. There will be a craneway between each building, into which the trains of the Terminal railway will be run. Each of the 6 craneways will be 40 feet wide.

On the lower floors of the buildings, cars and material will be stored, while on the upper floors parts will be made. All these structures will have glass fronts from the third to the sixth floor.

A new power plant is being erected and it will be, according to the Ford company, one of the largest in the world and will have the largest gasoline engine (of 30,000 horsepower) thus far constructed in the world. The power plant will be 240 feet long, 150 feet wide and 85 feet high, and will cost about $1,500,000. When the plant and the other buildings have been completed it will represent an outlay of about $5,000,000.

## Brown-Lipe-Chapin Get New Differential

NEW YORK CITY, July 6—The Brown-Lipe-Chapin Co., Syracuse, N. Y., has entered into an agreement with the M. & S. Gear Co., Kansas City, Mo., whereby the Syracuse company secure American manufacturing rights to the M. & S. spiral gear differential. It is the company's intention to manufacture the device in quantities for motor car and axle makers.

The device was invented by William Muehl who constitutes the M. in the M. & S. company. The S. is L. H. Scurlock. The differential differs from the ordinary type in that power is transmitted from the master gear to the axle shaft through spiral gears. Spiral gears are anchored in a housing which is attached to the master gear. The axes of the spiral gears constitute arcs of the circumference of rotation of the housing and they engage a corresponding gear on the shaft.

The advantage claimed for this construction is that tractor effort is equalized. The car wheel which has the greater traction received the greater power through the differential. In case one wheel is in sand or mud and does not pull and the other wheel is on solid ground this wheel will receive sufficient power to pull the car. Dangers of skidding on slippery pavements are said to be reduced by this type of construction.

## Metropolitan S. A. E. Discusses Headlights

(*Continued from page* 91)

to quote Dr. Steinmetz, saying that the light that entered the eye was transformed into heat and absorbed by the body. When the glare is marked this heat is sufficient to cause inflammation. The No-Glare glass is designed to cut out the blue, violet and ultraviolet rays and in this way to eliminate the harmful glare.

The J-M frosted glass lens secures its non-blinding qualities, according to Otto Luyties, by the use of a concave, frosted glass lens at the bottom of which there is a slot of white glass which permits the rays to be thrown on the road in front of the car. These rays illuminate the road far enough ahead to answer the requirements of ordinary driving and the non-glaring qualities of the frosted glass remove the objections in city work.

The discussion which followed was opened by A. L. McMurtry, consulting engineer, of South Beach, Conn. He pointed out the requirements of the non-glaring headlight and stated that there seemed to be several methods of approaching the problem. This discussion was a round-table affair and very largely concentrated itself on how glare could be accurately defined and its causes. J. G. Middleton, maker of the Glare Breaker, stated that he believed that the definition of glare would have to be left to the county constable and that he would be the one who decided whether or not the headlight was glaring. For this reason Mr. Middleton stated that it was his belief that the subject should be treated in a direct, practical manner, rather than in a theoretical way. Leonard Kebler stated that it was his belief that the headlights should be deflected toward the ground instead of straight ahead.

# 150,000 More Cars in 1914 Than 1913

## Registrations of 1,203,770 Cars in 33 States for 6 Months Proves Times Are Sound

ALBANY, N. Y., July 3—"Despite the widespread talk of hard times and business depression which has characterized the last six months," says Mitchell May, Secretary of State, "the motor car industry does not appear to have been but slightly affected, if a comparison of the registration statistics reported by the thirty-three states below listed is made.

"According to the most accurate figures obtained by direct communication with the licensing authorities in these commonwealths, during the first half of the present year the number of automobiles registered increased from 1,065,000, recorded for the entire period of 1913, to 1,203,770, the total reported from January to June 25th, of the present year, a gain of nearly 150,000 cars; motorists paying $8,386,108.69 in license fees since the first of the year.

"A substantial increase is noted in twenty-six states, New York still leading far in advance with Illinois retaining second place, while California, owing to her new law requiring re-registration of all cars, jumps from seventh to third place. Ohio drops back into fourth, followed by Pennsylvania, where the figures reach nearly the hundred thousand mark."

| State | 1914 Jan. to June 25 | 1913 Jan. to Dec. | 1911 Jan. to Dec. |
|---|---|---|---|
| New York | 147,186 | 132,579 | 81,655 |
| Illinois | 110,000 | 95,592 | 42,000 |
| *California | 104,830 | 60,000 | 14,566 |
| Ohio | 102,280 | 86,153 | 45,150 |
| Pennsylvania | 92,098 | 79,846 | 43,074 |
| Iowa | 87,897 | 77,269 | 29,323 |
| Michigan | 63,970 | 54,566 | 27,664 |
| Massachusetts | 63,511 | 57,197 | 36,975 |
| Minnesota | 58,800 | 45,054 | 19,000 |
| Indiana | 55,500 | 61,177 | 12,000 |
| New Jersey | 49,390 | 49,588 | 48,266 |
| Wisconsin | 45,661 | 34,647 | 7,241 |
| Missouri | 45,099 | 39,541 | 18,225 |
| Connecticut | 24,582 | 20,136 | 13,500 |
| Washington | 19,200 | 21,000 | 8,000 |
| Georgia | 18,000 | 12,919 | 5.700 |
| South Dakota | 16.500 | 14,700 | 3,250 |
| North Dakota | 14,900 | 12,504 | 7,185 |
| Maryland | 13,568 | 12,567 | 7,097 |
| North Carolina | 1,600 | 7,710 | 1,452 |
| Virginia | 11,452 | 9,023 | 3,909 |
| †New Hampshire | 8,466 | 7,254 | 4,489 |
| Nebraska | 7,770 | 34,943 | 7,766 |
| Vermont | 6,602 | 5,913 | 3,298 |
| ‡West Virginia | 6,150 | 5.007 | 2,041 |
| Alabama | 6,000 | 5,314 | .. |
| Kentucky | 5,857 | 7,551 | 2,680 |
| Rhode Island | 5,151 | 10,000 | 5,863 |
| Arkansas | 4,555 | 5,100 | 1,500 |
| Delaware | 2,561 | 2,145 | 1.228 |
| New Mexico | 2,425 | 1,972 | .. |
| Utah | 1,292 | 3,406 | 442 |
| Florida | 917 | 3,270 | 1,333 |
| | 1,203,770 | 1,065,000 | 505,872 |

*Re-registration January, 1914. †January to June 1. ‡July, 1913, to June 25, 1914.

## Market Reports for the Week

MARKET reports for this week remained generally steady. With the exception of tin and Bessemer and open-hearth steels, prices remained at last week's prices. There were a few small changes, but of no consequence. On Thursday, both Bessemer and open-hearth steels dropped $.50 per ton. Tin rose $.87 per 100 pounds with a reaction at the end of the week, followed by a $.25 reduction in price. There were freer offerings of nearby positions in this city at concessions and there was a small demand from the consumers. A reaction in copper was followed by slightly higher prices. Lead was dull but steady.

| Material | Wed. | Thurs. | Fri. | Sat. | Mon. | Tues. | Week's Changes |
|---|---|---|---|---|---|---|---|
| Antimony | .05¾ | .05¾ | .05¾ | .05¾ | .05¾ | .05¾ | ....... |
| Beams & Channels, 100 lbs. | 1.26 | 1.26 | 1.26 | 1.26 | 1.26 | 1.26 | ....... |
| Bessemer Steel, ton | 18.50 | 19.00 | 19.00 | .... | 19.00 | 19.00 | —.50 |
| Copper, Elec., lb. | .13½ | .13½ | .13½ | .13⅗ | .13¾ | .13 7/10 | +.00⅕ |
| Copper, Lake, lb. | .13⅝ | .13⅝ | .13⅝ | .13¾ | .13⅞ | .13⅞ | +.00¼ |
| Cottonseed Oil, bbl. | 7.22 | 7.20 | 7.20 | 7.26 | 7.26 | 7.24 | +.02 |
| Cyanide Potash, lb. | .17 | .17 | .17 | .17 | .17 | .17 | ...... |
| Fish Oil, Menhaden, Brown | .40 | .40 | .40 | .40 | .40 | .40 | ....... |
| Gasoline, Auto, bbl. | .14 | .11 | .14 | .14 | .14 | .14 | ....... |
| Lard Oil, prime | .93 | .93 | .93 | .93 | .93 | .93 | ....... |
| Lead, 100 lbs. | 3.90 | 3.90 | 3.90 | 3.90 | 3.90 | 3.90 | ....... |
| Linseed Oil | .54 | .54 | .54 | .54 | .54 | .54 | ....... |
| Open-Hearth Steel, ton | 19.50 | 19.00 | 19.00 | 19.00 | 19.00 | 19.00 | —.50 |
| Petroleum, bbl., Kans., crude | .75 | .75 | .75 | .75 | .75 | .75 | ....... |
| Petroleum, bbl., Pa., crude | 1.75 | 1.75 | 1.75 | 1.75 | 1.75 | 1.75 | ... ... |
| Rapeseed Oil, refined | .59 | .59 | .59 | .59 | .59 | .59 | ....... |
| Rubber, Fine Up-River, Para | .69 | .69 | .69 | .69 | .69 | .69 | ....... |
| Silk, raw, Ital | .. | 5.00 | .. | .. | 5.00 | 5.10 | +.10 |
| Silk, raw, Japan | .. | 4.35 | .. | .. | 4.33 | 4.25 | —.10 |
| Sulphuric Acid, 60 Baume | .90 | .90 | .90 | .90 | .90 | .90 | ....... |
| Tin, 100 lb. | 31.13 | 31.00 | 31.00 | 31.70 | 32.25 | 32.00 | +.87 |
| Tire Scrap | .04¾ | .04¾ | .04¾ | .04¾ | .04¾ | .04¾ | ....... |

## $1,000,000 Indestructible Tire Co. Chartered

WILMINGTON, DEL., July 6—The Indestructible Tire Co. of the United States has been incorporated under the laws of Delaware, with a capital of $1,000,000, to purchase, lease, own, hold and deal in and with tires made from rubber, metal, cloth or other fabrics, for all kinds of vehicles. The incorporators are John McLarin, F. B. Knowleton and S. V. Dowling, all of New York City.

CLEVELAND, O., July 8—The Garford Co., Elyria, has passed the quarterly dividend of 1¾ per cent. on the preferred stock. There is outstanding $500,000 of the issue. The brokers are attempting to arrange a plan whereby an exchange of Garford preferred for Willys-Overland Co. stock can be made.

## Stewart-Warner Earns $400,000 on Common Stock

NEW YORK CITY, July 7—The earnings of the Stewart-Warner Speedometer Co. in the quarter ended June 30 last were more than $400,000 on the common stock and for the 6 months period ended on the same date total earnings applicable to dividends were around $600,000. This showing is equivalent to the full year's 7 per cent. dividend on the preferred and 6 per cent. for 6 months on the common.

DETROIT, MICH., June 7—A dividend of 5 per cent. was ordered paid by Referee in Bankruptcy, L. F. Joslyn yesterday to 753 creditors of the R. C. H. corp., including the agents who had made deposits.

## New Stock Sold by Miller Rubber Co.

AKRON, O., July 4—The Miller Rubber Co. has succeeded in reducing and rearranging its current debt by retiring of its old preferred stock and reissuing therefor new first preferred shares to the amount of $500,000.

A Cleveland banking house, Borton & Borton, has purchased $400,000 of the stock, which is being offered to the public at 98 plus accrued dividends. $1,000,000 in common stock is outstanding out of a total authorized $1,500,000.

The net earnings for the last fiscal year were five times the preferred dividend requirements on the new issue. The company's sales have increased from $289,840 in 1910 to $1,658,618 in the 11 months ended with May, 1914.

## Gasoline Prices Down Throughout Country

NEW YORK CITY, July 6.—Price cutting on gasoline has not only hit this section of the country, but also out West. In Portland, Ore., the automobilists are generally taking advantage of a little gasoline war that has sprung up in that city. The big companies are now selling wholesale at 15½ cents in 50-gallon lots. To big commercial houses who use gasoline in large quantities this price is reduced another half cent, while to garage men and retail sellers of gasoline who use still larger quantities the price is reduced still another half cent.

In Hartford, Conn., all the garages have dropped to 15 cents a gallon in an effort to break up the cut-rate element. Practically every dealer asserts that because of the cut rates of the independent concerns business has fallen away. With the drop by the dealers to 15 cents they assert that

business is returning. It is asserted that the price will drop still lower during the next two or three weeks.

The State Corporation Commission in Oklahoma has issued orders fixing the prices on gasoline throughout the State. The retail price is not to exceed 15 cents a gallon except in towns where delivery has to be made from other towns by wagons. The wholesale price is fixed at 12 cents and 13 cents a gallon, the variation being due to the difference in freight rates. In cities and towns close to stations and centers of distribution, the retail price is not to be over 14 cents. The order takes effect at once.

## Peerless Conserves Resources for New Plans

CLEVELAND, O., July 6.—The Peerless Motor Car Co. has deferred the payment on the 7 per cent. cumulative preferred stock, because the directors have decided to conserve the resources in view of the fact that the company will soon put a popular-priced car on the market in connection with its present higher-priced line of automobiles.

## Walpole Receivers Report a Profit

BOSTON, MASS., July 6—The receivers of the Walpole Tire & Rubber Co., have filed their second report, showing a net profit of $83,801.03 for the 5 months ending May 31. The total earnings amounted to $112,359.64 on sales aggregating $708,486.90.

The receivers report total assets of $406,442.94 for the Walpole Rubber Co., Ltd., of Granby, Que., and assets of $342,074.69 for the Walpole Shoe Supply Co. The latter has a surplus of $34,688.44, and the former a surplus of $27,-323.05.

## Fire Destroys One of Havers Factories

DETROIT, MICH., July 8—*Special Telegram*—The main plant of the Havers Motor Car Co. at Port Huron, Mich., was destroyed by fire last night. Several finished cars, chassis, bodies and parts were consumed, the damage being estimated at $60,000. The origin of the fire is unknown as yet but thought to have been in the assembly room.

## June Sales of Packard Trucks, $825,394

DETROIT, MICH., July 2—The Packard Motor Car Co. states that the sales of Packard trucks to users during the month of June totaled $825,394. This is exclusive of bodies. Not only is this total remarkable in the face of prevalent business conditions but it culminates 4 months of record breaking truck sales.

In March the Packard company sold more than $750,000 worth of trucks. In April the business total was 60 per cent. greater than in April, 1913, while the May total was also 60 per cent. greater than in the corresponding month last year.

The June sales exceed those of June, 1913, by $256,994, an increase of nearly 50 per cent.

The largest individual order received during June was one for twelve Packard 3-ton trucks from the Marshall Field Company, Chicago.

# Automobile Securities Quotations

NEW YORK CITY, July 8—Continued inactivity marked the automobile and allied securities during the past week. Most of the stocks made a slightly better showing than a week ago today, there being many slight gains noticeable. The number of stocks showing losses is less this week and a slightly optimistic tone is to be noticed throughout. Brokers state that they expect more pronounced gains the coming week.

The only losses of any consequence during the past week were one of five points by Studebaker preferred, 1½ points by Texas Co., 1 by Vacuum Oil and also by New Departure common and preferred. Willys-Overland continues very strong in both common and preferred showing a gain of 7 points on the common and 2 on the preferred. The full quotations for the week follow:

| Security | Wednesday Bid | Wednesday Asked | Thursday Bid | Thursday Asked | Friday Bid | Friday Asked | Monday Bid | Monday Asked | Tuesday Bid | Tuesday Asked | Week's Change | 1913 Bid | 1913 Asked |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ajax-Grieb Rubber Co. com | 220 | .. | 220 | .. | 220 | .. | 220 | .. | 220 | .. | .. | 155 | 165 |
| Ajax-Grieb Rubber Co. pfd | 98 | 104 | 98 | 104 | 98 | 104 | 98 | .. | 98 | .. | .. | 94 | 99 |
| Aluminum Castings pfd | 98 | 100 | 98 | 100 | 98 | 100 | 98 | 100 | 98 | 100 | .. | 97 | 100 |
| Case T. M. Co., J. I. | 80¾ | 86 | 80¾ | 86 | 82 | 86 | 81 | 86 | 81 | 86 | + ¼ | .. | .. |
| Chalmers Motor Co. com | 98 | 103 | 98 | 103 | 98 | 103 | 101 | 104 | 101 | 104 | +3 | 135 | .. |
| Chalmers Motor Co. pfd | 95 | 98 | 95 | 98 | 95 | 98 | 94 | 97 | 94 | 97 | +1 | 98 | 102 |
| Electric Storage Battery Co. | 50½ | 51½ | 51 | 52 | 51 | 52 | 51 | 52 | 51 | 52 | .. | .. | .. |
| Firestone Tire & Rubber Co. com | 299 | 304 | 299 | 304 | 299 | 304 | 300 | 305 | 300 | 305 | +1 | 270 | 280 |
| Firestone Tire & Rubber Co. pfd | 108½ | 110 | 108½ | 110 | 108½ | 110 | 108½ | 110 | 108½ | 110 | .. | 104 | 106 |
| Garford Co. pfd | 75 | 85 | 75 | 85 | 75 | 85 | 75 | 85 | 75 | 85 | .. | 85 | 95 |
| General Motors Co. com | 90 | 90½ | 89⅝ | 90½ | 92 | 93½ | 92¼ | 93 | 92¼ | 93 | —1¼ | 26 | 30 |
| General Motors Co. pfd | 92 | 93 | 92 | 93 | 92½ | 94 | 92 | 93 | 92 | 93 | .. | 72 | 75 |
| B. F. Goodrich Co. com | 23¼ | 24 | 23⅜ | 24 | 23⅜ | 24 | 25 | 25¾ | 25 | 25¾ | +2 | 27 | 28 |
| B. F. Goodrich Co. pfd | 87½ | 88 | 87½ | 88 | 87½ | 88 | 88 | 89 | 88 | 89 | — ¼ | 91 | 93 |
| Goodyear Tire & Rubber Co. com | 166 | 172 | 166 | 172 | 166 | 172 | 166 | 170 | 166 | 170 | .. | 325 | 335 |
| Goodyear Tire & Rubber Co. pfd | 96 | 98 | 96 | 98 | 96 | 98 | 96 | 97½ | 96 | 97½ | —2 | 97 | 98½ |
| Gray & Davis Co. pfd | 98 | 102 | 98 | 102 | 98 | 102 | 98 | 102 | 98 | 102 | .. | .. | .. |
| International Motor Co. com | .. | 3 | .. | 3 | .. | 3 | .. | 3 | .. | 3 | .. | 3 | 5 |
| International Motor Co. pfd | 3 | 9 | 3 | 9 | 3 | 9 | 3 | 9 | 3 | 9 | .. | 18 | 25 |
| Kelly-Springfield Tire Co. com | 56 | 58 | 55 | 58 | 56½ | 57 | 56 | 58 | 56 | 59 | +1 | .. | .. |
| Kelly-Springfield Tire Co. 1st pfd | 75 | 80 | 70 | 80 | 70 | 80 | 76 | 80 | 70 | 80 | .. | .. | .. |
| Kelly-Springfield Tire Co. 2d pfd | 98 | 100 | 90 | 100 | 90 | 100 | 94 | 100 | 90 | 100 | .. | .. | .. |
| Lozier Motor Co. com | .. | 20 | .. | 20 | .. | 20 | .. | 20 | .. | 20 | .. | 15 | 26 |
| Lozier Motor Co. pfd | .. | 41 | .. | 41 | .. | 41 | .. | 41 | .. | 41 | .. | .. | 90 |
| Maxwell Motor Co. com | 14 | 14½ | 14 | 14½ | 14½ | 14⅞ | 14½ | 14⅞ | 14½ | 14¾ | — ¼ | 3 | 3½ |
| Maxwell Motor Co. 1st pfd | 40½ | 40⅞ | 40½ | 41 | 42½ | 42¾ | 42 | 43 | 43½ | 44 | +1½ | 24 | 27 |
| Maxwell Motor Co. 2d pfd | 16½ | 18 | 16½ | 18 | 17¾ | 18½ | 17¾ | 18¼ | 17¼ | 18 | + ¾ | 7 | 8½ |
| Miller Rubber Co. | 138 | 140 | 138 | 140 | 138 | 140 | 138 | 140 | 138 | 140 | .. | 133 | 137 |
| New Departure Mfg. Co. com | 126 | 128 | 126 | 128 | 126 | 128 | 125 | 127 | 125 | 127 | —1 | .. | .. |
| New Departure Mfg. Co. pfd | 106 | .. | 106 | .. | 106 | .. | 105 | 108 | 105 | 108 | —1 | .. | .. |
| Packard Motor Co. com | 93 | .. | 93 | .. | 93 | .. | 103 | 112 | 163 | 112 | +10 | .. | .. |
| Packard Motor Co. pfd | 97 | 100 | 97 | 100 | 97 | 100 | 97 | 100 | 97 | 100 | .. | .. | .. |
| Peerless Motor Co. com | 10 | 17 | 10 | 17 | 10 | 17 | 10 | 17 | 10 | 17 | .. | 45 | 50 |
| Peerless Motor Co. pfd | .. | 50 | .. | 50 | .. | 50 | .. | 50 | .. | 50 | .. | .. | 96 |
| Pope Mfg. Co. com | .. | 1 | .. | 1 | .. | 1 | .. | 1 | .. | 2 | .. | 5 | 10 |
| Pope Mfg. Co. pfd | .. | 3 | .. | 3 | .. | 3 | .. | 4 | .. | 4 | .. | .. | 35 |
| Portage Rubber Co. com | .. | 30 | .. | 30 | .. | 30 | .. | 30 | .. | 30 | .. | 30 | 40 |
| Portage Rubber Co. pfd | .. | 90 | .. | 90 | .. | 90 | .. | 90 | .. | 90 | .. | 96 | 99 |
| *Reo Motor Truck Co. | 11 | 11½ | 11 | 11½ | .. | 11½ | 11¾ | 12¼ | 11¾ | 12¼ | + ¾ | 10½ | 11½ |
| *Reo Motor Car Co. | 17¾ | 18¼ | 17¾ | 18¼ | 17¾ | 18¼ | 18 | 18½ | 18 | 18½ | + ¼ | 19 | 20½ |
| Rubber Goods Mfg. Co. pfd | 100 | 110 | 100 | 110 | 100 | 110 | .. | .. | .. | .. | .. | .. | .. |
| Russell Motor Co. com | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Russell Motor Co. pfd | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Splitdorf Electric Co. pfd | 40 | 50 | 40 | 50 | 40 | 50 | 40 | 50 | 40 | 50 | .. | .. | .. |
| Stewart Warner Speedometer Corp. com | 47½ | 48½ | 47½ | 48½ | 47½ | 48½ | 51¼ | 52 | 51¼ | 52 | +3¾ | .. | .. |
| Stewart Warner Speedometer Corp. pfd | 97½ | 99 | 97½ | 99 | 97½ | 99 | 99 | 101 | 99 | 101 | +1½ | .. | .. |
| Studebaker Co. com | 28½ | 30 | 29 | 29¾ | 29¼ | 29¾ | 29½ | 30½ | 29½ | 30½ | + ¾ | 22 | 25 |
| Studebaker Co. pfd | 80 | 86 | 80 | 84½ | 81 | 85 | 80 | 85 | 80 | 85 | —5 | 84 | 86 |
| Swinehart Tire & Rubber Co. | 85 | 86 | 85 | 86 | 85 | 86 | 85 | 87 | 85 | 87 | .. | 85 | 88 |
| Texas Company | 141½ | 143⅛ | 142¼ | 143 | 143¼ | 143½ | 142 | 143 | 142 | 143 | —1½ | .. | .. |
| U. S. Rubber Co. com | 58½ | 59 | 59 | 59½ | 59½ | 59⅝ | 59½ | 60 | 59½ | 60 | +2¼ | 60½ | 61 |
| U. S. Rubber Co. 1st pfd | 102 | 103 | 102⅜ | 103 | 102⅞ | 104 | 102½ | 103½ | 102½ | 103½ | +1 | 103 | 104 |
| Vacuum Oil Co. | 220 | 223 | 218 | 223 | 218 | 221 | 218 | 221 | 219 | 222 | —1 | .. | .. |
| White Co. pfd | 107 | 110 | 107 | 110 | 07 | 110 | 107 | 110 | 107 | 110 | .. | 102 | 104 |
| Willys-Overland Co. com | 86½ | 87½ | 88 | 89 | 88 | 90 | 89 | 90 | 89 | 90 | +7 | 56 | 60 |
| Willys-Overland Co. pfd | 93 | 95 | 93 | 95½ | 94½ | 95 | 94 | 96 | 95 | 95½ | +2 | 85 | 93 |

*The par value of these stocks is $10; all others $100.

# Austin Sues Cadillac Co. on Two-Speed Axle Patent

## Damages and Restraining Order Asked—Defense Is That Superior Prior Patent Was Purchased —Austin and Cadillac Axles Differ

GRAND RAPIDS, MICH., July 7—The two-speed rear axle used and exploited by the Cadillac Motor Car Co., Detroit, Mich., is alleged to be an infringement in an action filed in the United States District Court here by W. S. Austin, head of the Austin Automobile Company, Grand Rapids.

Austin, suing on patent No. 1,091,618 issued to him on March 31, 1914, asks for an injunction against the Cadillac company and damages for the use of the axle in 15,000 cars.

In defense the Cadillac company explains that Austin endeavored to interest it in his axle in the Spring of 1913 but rejected the invention because it believed the clutch on the rear axle and clutch on the drive shaft was an unsatisfactory arrangement.

A device incorporating one clutch, located on the drive shaft, patented in 1902 by Willis G. Caffrey, was preferred, explains the Cadillac Co., and this patent was purchased.

In a statement Austin says:

"Cadillac became interested in my two-speed axle when it was exhibited at the Chicago automobile show in February, 1913. The company wired me to send them an axle by express and wrote requesting complete drawings showing different constructions that would be suitable for the Cadillac car. I sent them an axle and drawings, and from my correspondence and interviews with them felt assured they intended to adopt my axle and pay a suitable royalty for the use of it.

"As my patent claims were still pending, I could not give them definite reply to their request for full information as to the claims that would be allowed. They finally dropped their correspondence with me and put out a two-speed axle under their own name."

"Our patent attorneys," said Henry M. Leland, of the Cadillac company, "inform us that we do not infringe the Austin patents in any respect. We considered the two-speed axle proposition five years ago and from then until the time we adopted it we experimented with various designs."

### Court Advises Separate Sale for Pope Plants

HARTFORD, CONN., July 8—Judge William L. Bennett, of the Superior Court, to-day dismissed the petition of the Boston creditors of the Pope Mfg. Co., which was to the effect that the entire assets of the Pope Co. be sold at auction in Massachusetts by the receiver, Col. Geo. Pope.

Judge Bennet was led in this action of dismissal by the belief that if the bicycle plant at Westfield, Mass., and the automobile plant in this city should be sold separately, and that it will be for the benefit of the preferred stock holders. The creditors will undoubtedly be paid in full and if a good sale is made there may be something for the stockholders. This belief is based on the fact that the Westfield, Mass., plant where bicycles are manufactured has always been a highly satisfactory and successful plant, whereas the automobile plant at Hartford has not been profitable.

Judge Bennett believes that the offer of $1,800,000 made by a Boston syndicate for the entire assets is like sacrificing the property, and it was to avoid this that he dismissed the petition and has advised Receiver Col. Geo. Pope to get an order to sell the property separately. The memorandum from Judge Bennett says:

It appears from the evidence that the property of the defendant corporation in Connecticut consists of a large manufactory and plant for the making, selling and repairing of automobiles and motor trucks, and that the corporation has in the state of Massachusetts a manufactory and plant for the construction, selling and repairing of bicycles and motorcycles.

The business carried on in the establishment in Massachusetts is entirely separate and distinct from that carried on in the Connecticut factories. The Massachusetts business has prospered and has been and is exceedingly profitable. The Connecticut business, on the contrary, has failed to earn profits. Both of these concerns have been carried on in the name of the Pope company.

Since the two establishments of the defendant are in fact separate establishments, each engaged in carrying on its own business, the goodwill alone being the connection between them, if this was all the petitioners had to offer as a reason for a sale at auction of both establishments together as a whole, I should not consider such sale advisable. Each manufacturing plant is of great value, and while customers might be found desirous of purchasing a bicycle business, and others willing to bid for the automobile plant, it would seem more difficult to find one purchaser for both, and the result might easily be that one or the other might be sold for less than its real value.

The petitioners, however, say they have obtained a purchaser who will bid at the auction sale, if such sale is ordered, $1,800,000 for the whole property and assets; that he will bid no greater sum than this, and that he will bid for the whole of the property or for none.

#### No Other Bidder?

Inasmuch as no one has suggested to the court that any one else has any intention of bidding at the sale, and as it is extremely improbable that any such person will appear, this is in effect a proposition to the two courts having the property and assets of the Pope Manufacturing company in control, to permit a sale for $1,800,000 and this court must endeavor to ascertain whether the sum offered is a fair and adequate price.

The evidence shows that the Massachusetts plant is worth, and ought to bring, $1,250,000, and having heard the evidence I am of the opinion that the Connecticut property is worth and may fairly be expected to sell for more than $550,000. If this petition should be granted it would seem that the Connecticut property would be sacrificed in order to obtain the Massachusetts property.

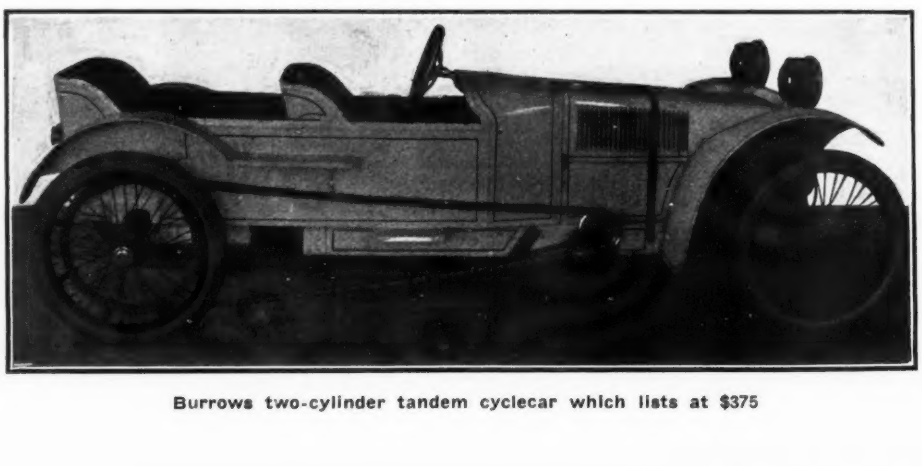
The receiver is of the opinion that however that property is sold, the creditors may reasonably expect to be paid in full, and there is a chance, if the properties are sold separately, to obtain something for the preferred stockholders. This is my own opinion.

The receiver is, however, advised to make application to the court, or if the court is not in session, to a judge of the superior court sitting in chambers, for an order for the sale of the property and assets of the defendant corporation.

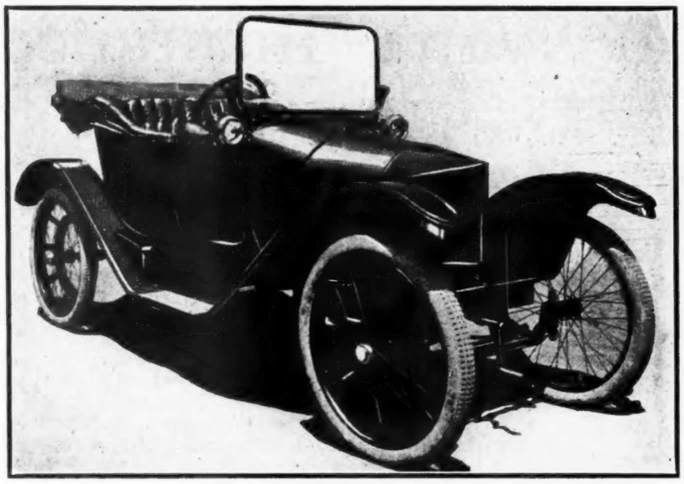
### Perry Chain Co., Infringing, Must Quit

CINCINNATI, O., July 6—The Perry Chain Co., Lansing, Mich., which began manufacturing tire chains in 1909 and which since that date has been prosecuted in the courts by the Weed Chain Tire Grip Co., was ordered to cease operations last week by the United States Circuit Court of Appeals in Cincinnati. This court sustained the decision of the United States District Court for the Eastern District of Michigan, which held the Parsons patent No. 723,299 infringed in an action which was terminated last Fall.

The Perry company originally provided its cross chains with tension springs for the professed purpose of causing the grip to fit snugly and not creep. In 1911 this type of chain was substantially abandoned and was followed by the "Weeder." In 1912 the "Weeder" grip was enjoined, whereupon the Perry company began to market the Peerless and Emergency grips, both of the "anchored" type. The Perry company contended that the Parsons device was anticipated by the armor plate guard used on the old style rubber tires of the Thomson traction engine about 1870. This defense was not accepted by the court, which held that Parsons was originally the inventor of the anti-skid chain.



Burrows two-cylinder tandem cyclecar which lists at $375



Koppin light car with V-radiator and streamline body

Following the decision of the lower court a special master rendered an accounting and awarded the Weed company $17,-498.50 damages. A motion for confirmation of the master's report was made and later withdrawn in the appellate court but will be made again.

The Weed company also recently secured a preliminary injunction against the Woolston Mfg. Co., Trenton, N. J., which has been making tire chains and parts.

### Koppin Light Car To Sell at $385

DETROIT, MICH., July 5.—The Koppin light car has made its appearance in Detroit. It is built by the Koppin Motor Company, Fenton, Mich., of which H. S. Koppin, one of the best known real estate men in Michigan, is the president. The Koppin company occupies the plant of the old Fenton Cyclecar Company, which has been reorganized after the death of several of its stockholders.

For the present there will be only one model Koppin chassis with one standard body. The motor is an air-cooled, two-cylinder De Luxe of the V type, 3½ inches bore and 3⅝ inches stroke, developing about 13 horsepower. Transmission is of the friction type mounted on large ball bearings.

The standard equipment of the Koppin, which sells at $385, consists of top, side curtains, special design windshield, electric side and tail lights with 6 amp. 60 hr. 21 plate storage battery controlled by dash switch, horn, repair kit, pump and tools.

The offices of the Koppin company are presently at 305 Breitmeyer building, Detroit.

### Longuemare To Push Imported Carburetors

NEW YORK CITY, July 8—Following the litigation between the Stromberg Motor Devices Co. and the Longuemare Carburetor Co. in the United States District Court in New York City, the Longuemare company is preparing to push the importation and sale of its foreign made carbureters. A preliminary injunction was issued by Judge Hand, but it affects only the making of carbureters in America. The Longuemare company is permitted to import and sell under a $10,000 bond which it will file before July 22. "The Longuemare Carburetor Co.," states Ludwig Arnson, one of the proprietors, "is convinced it does not infringe the Richard and Ahara patents and, believing that this will ultimately be demonstrated, is preparing to push the imported Longuemares."

# Freight Must Be Paid for Blocking, Decides Commission

## Interstate Board Disallows Dunnage in Protest of National Automobile Chamber Against S. W. Railroads

NEW YORK, July 5—The dunnage allowances which have been conceded by practically all of the railroads in the United States have been disapproved by the Interstate Commerce Commission and after July 15 all blocking for motor cars shipped in freight cars will have to be paid for at the same rate as is charged for the shipment of the cars which are blocked.

The decision affirms a ruling of the Southwest Tariff Committee which represents practically all of the railroads in the Southwest. The roads originally allowed 500 pounds of blocking to be carried free of freight charges, provided the weight of the carload was above the minimum. This dunnage allowance was made on the theory that it induced shippers to use care in blocking up their cars and. therefore, was of benefit to both the railroad and the manufacturer.

The Southwestern roads cancelled their dunnage allowance several months ago and the National Automobile Chamber of Commerce protested to the Interstate Commerce Commission against the cancellation. The commission denies the chambers petition on the ground that dunnage is in the same class as crating or boxes in which other wares are shipped and that regardless of the ultimate benefit it should be excepted. Pending the decision the cancellation had been suspended.

### A Truck Convention in October

NEW YORK, July 2.—Plans are being perfected by the National Automobile Chamber of Commerce for a convention of commercial vehicle interests to be held some time in October to further advance the excellent work that has been done during the past two years.

### Burrows Cyclecar Lists at $375

NEW YORK CITY, July 6—With its long, narrow hood, high cowl and tandem seating, the $375-Burrows cyclecar has a very speedy appearance. It is equipped with a 13-horsepower, two-cylinder, air-cooled motor which has its cylinders set at an angle of 45 degrees. The crankshaft is carried on imported annular ball bearings. Ignition is supplied by an Atwater Kent Unisparker and carburetion is furnished by a Schebler, automatic type.

Speed changes are provided by a friction transmission located forward of the driver and it gives four speeds forward and reverse. The jackshaft is a special, flexible design mounted on annular ball bearings. Final drive is by double V-belts to large pulleys on the rear wheels. An adjustment for the stretching of the belts is provided.

Selected ash, having a cross-section 1 by 5 inches, is the material from which the frame is made, it being reinforced by steel flitch plates and cross members. The car is suspended upon quarter-elliptic vanadium springs, front and rear.

Twenty-eight by 3-inch Goodyear non-skid tires, mounted on wire wheels, are employed. The steering wheel is 14 inches in diameter and the gear is provided with an adjustment.

The equipment includes J.-M. Mobilite electric headlights, tail light, horn, and full tool equipment. Its weight is 700 pounds.

This cyclecar is manufactured by the Burrows Cyclecar Co., Ripley, N. Y.

# Garagemen and Dealers Win Separator Fight

NEW YORK CITY, July 8—The garagemen and dealers of New York City have won their fight against the gasoline separator ordinance. The board of aldermen at its last meeting of the summer held yesterday, July 7, acceded to the request of four garagemen and dealers' associations in Greater New York and passed Alderman Squire's ordinance, which repeals the statute placed upon the books 4 years ago requiring the installation of separators in garages. The final vote stood 57 for Alderman Squire's ordinance and 1 against it. This ends 4 years of prosecution by the city and insistence by the municipal authorities that garages install, at high expense, a device which when working at its best would not prevent gasoline and oil getting into the sewers, and in a majority of instances would not operate at all.

At a hearing before the welfare committee, prior to the hearing of the board of aldermen, Attorney Charles Thaddeus Terry, for the garagemen, had classed the prosecution by the city as tyranny and the welfare committee was won over to the side of the automobile men, laboring in behalf of the repeal of the old ordinance.

# Underwriters Not To Write Insurance

## Business Is To Be Centralized—Data on Both Chauffeurs and Owners To Be Compiled—Plan To Recover Stolen Cars

NEW YORK CITY, July 1—The motor car insurance business of the United States is to be centralized and systematized insofar as the adjustment of losses is concerned; data as to every chauffeur and as to car owners applying for insurance is to be compiled and classified; recovery of stolen cars is to be made the work of a nation-wide bureau. These are the objects of the Manufacturers and Dealers Motor Underwriters, Inc., in a proposed plan which has been adopted, following alterations in its policy as announced in THE AUTOMOBILE for June 18, page 1286.

It was originally proposed that the company represent two of the large insurance companies and make motor car dealers its agents, permitting the dealer to sell insurance and providing that repairs covered by insurance be made by the dealer in the car damaged, regardless of what city the dealer be located in.

Under the new plan the company will write no insurance at all, will appoint no agents but transforms itself into a service bureau. A rule will forbid anyone connected with the company from assisting in the securing or placing of any insurance and it will act impartially toward all companies.

The Automobile Service and Inspection Bureau has been formed theoretically as a department of the business but in reality all the company's business will be transacted by this bureau. In fact, the company name may later be relegated to the background and the name of the bureau brought forward as the name of the business.

It has been proposed that this service or bureau be supported, by the various companies making use of it, through a subscription based on a percentage of their premium income in motor car insurance. The service rendered to a company with $1,000,000 premium income would be twice as great and twice as expensive as the service rendered a company with but $500,000 premium income.

In brief, it is the purpose of the bureau to reduce the loss ratio of the insurance companies to a minimum, and it is believed that, with the co-operation of the insurance companies and the motor car dealers and manufacturers, much can be accomplished in this direction.

**Correspondents in Every City**

The bureau will have correspondents in every city of any size in the United States. In the majority of instances this correspondent will be the paid secretary of the local motor car dealers' association, or of the local automobile club. Through a connection with the motor car trade which has already been established, the bureau will be in touch with every dealer in the United States. This connection, together with the local correspondents, forms the basis of the field organization. The bureau will, of course, have branch offices in the larger cities, such as Boston, Philadelphia, Chicago, Detroit, San Francisco, and other important centers.

The companies subscribing to the bureau will have the privilege of submitting to it, each day, a list of applications for insurance received by them on second-hand, old, and mortgaged cars whenever there is any question concerning the underwriting value of the car. In submitting this data to the bureau it will only be necesary for the insurance company to give the name of the assured, his address, the name of the car, and the model.

The bureau will immediately communicate with its local correspondent and obtain a report on the assured as to all matters affecting the moral hazard of the risk. This report will be forwarded to the company, together with an estimate of the insurable value of the car involved. Estimates of the insurable value of cars will be made by skilled and experienced men who can quickly tell what the probable value of the car is from its description.

As the bureau will have no knowledge of the amount of insurance applied for, a fair and unprejudiced report can be made on any particular risk either as to the moral hazard involved or the value of the car. Such a report on risks of this kind will enable the insurance company to decide whether or not they should write the risk for the amount applied for.

By moral hazard is meant the risk attaching to the owner or the chauffeur; that is, whether they are reliable men, whether the business of the owner makes the risk greater or whether information secured about either owner or driver causes apprehension on the part of the insurance company. All these will be passed upon by the bureau.

It is the purpose of the bureau to establish a card index or registration of chauffeurs throughout the United States setting forth the record of each individual chauffeur. This, at first glance, may seem like a tremendous task, but, through the connection already established with the trade and various motor car clubs, is believed that it will be simply a matter of clerical work to obtain the names of all the better class of chauffeurs in the United States, and this index or registration can very rapidly be built up to a high state of efficiency.

The companies may submit to the bureau a list of risks with the names of the chauffeurs used, and the bureau will immediately report to the company on all those chauffeurs of whom it has record. If there be in the list the name of any chauffeur not upon the bureau's records, the local correspondent will be immediately communicated with and this record obtained.

**Stolen Cars To Be Traced**

An important feature of the work will be the tracing and recovery of stolen cars. Having, as it will, a correspondent in every city, and being in close touch, either directly or through these local correspondents, with all dealers and garages, the bureau can spread a net-work over the entire United States which will make it extremely difficult for the motor car thief to get very far.

It is proposed that whenever a car is stolen the insurance company or its agent immediately notify the bureau through its nearest correspondent. It will be the duty of that correspondent immediately to notify every dealer, garage, and police department, within a sufficient radius to locate the car quickly. With a system of this kind it would be impossible for the car thief to enter any city or any garage or local dealer's place of business. He would be picked up within a few hours after the bureau or its local correspondent has received notification of the theft.

In the recovery of a stolen car the company would necessarily pay all expenses incurred in securing its return after it has been located by the bureau.

As soon as the car is located, the company will be notified and may itself take such action as may be necessary to obtain the car; or its return will be undertaken by the bureau at the company's request.

Insurance companies, as a rule, have objected to being bound by an agreement to return a damaged car to the manufacturer or dealer, and have insisted that it is their right to get a number of bids on any repair job and to give it to the lowest bidder. This has often resulted in dissatisfaction on the part of the assured, even though the repairman be extremely efficient.

In this connection the bureau can render a great service. It can make it possible for all the subscribing insurance companies to make adjustment in the event of partial loss in any place in the United States, by having the car repaired by the nearest dealer in that make of car if he is equipped to handle the repairs and, at the same time, be assured that the repair bill will be absolutely legitimate.

The bureau will have intimate connection with the entire motor car trade and through this connection will be able to control all adjustments made in this way. If, for example, a car is damaged in a city like Syracuse the bureau will be in a position to recommend to the insurance company the best place to have the car repaired. In most instances, this will be the dealer who sold the car.

By having a connection with the manufacturer of that car, the bureau will be able to assure the insurance company that it will receive fair treatment from the dealer in that particular town. If it does not, the bureau will take the matter up with the manufacturer. Wherever any dealer persists in making excessive or unreasonable charges the bureau will refuse to recommend that dealer for repair work and his manufacturer will be notified immediately.

Furthermore, the bureau will have in its employ a number of experienced motor car men who will be able to judge any item of time or repair parts. It will be extremely difficult for an unscrupulous dealer to overcharge or conspire with his customer to do work on the car not made necessary by the accident.

The service, of course, does not contemplate supplanting the adjusters of the insurance companies. The object is to provide a service which will assist in adjustments and make it possible for the insurance companies to have their repair work done by the manufacturer or dealer at a less expense and in a better manner than elsewhere.

There are a number of additional features, valuable to underwriters, contemplated as part of the bureau which will be established as rapidly as possible. A careful record of all losses will be kept where there is any question concerning the claim. This will enable the bureau to furnish the insurance companies with data of value concerning various classes of risks.

A careful study will be made of traffic conditions throughout the United States and of all circumstances surrounding every possible kind of motor car hazard, all of which will be useful in insurance work. The bureau will co-operate with local authorites throughout the United States in an effort to eliminate from the public highway, as far as possible, the reckless driver. In all cases of reckless driving coming to its attention, the bureau will insist that the highway commissioner of the state involved revoke the driver's license.

## Transcontinental Tour Is Abandoned

MAPLEWOOD, N. H., July 7—At the midsummer meeting of the American Automobile Assn. now in session it has been decided to abandon the transcontinental tour which was to have terminated within the fair grounds of the Panama-Pacific exposition to be opened in San Francisco in January. In place of the tour the energies of the association will be devoted to routing the principal national highways and to the establishment of a rendezvous for members in San Francisco, Los Angeles and Seattle and to aid in every way possible members who are making the long trip across the continent.

Resolutions were also adopted in favor of a universal wheel tax, against unjust discrimination against automobilists and in favor of the regulation of individuals in their use of the highways. Governor Welker, of New Hampshire, who welcomed the members of the association, said that three trunk lines have now been constructed from the northern end of New Hampshire to the state line of Massachusetts on a state air basis. Commenting on federal aid ex-Congressman S. L. Powers stated that the national government would probably require the states to raise an amount at least equivalent to that appropriated by the nation.

## General Motors Business Shows Increase

NEW YORK CITY, July 8—A statement just issued by the General Motors Truck Co. shows a substantial growth in the company's business for the first 6 months of this year. June business exceeded that of June, 1913, by 17 per cent., while the increase for May was 36 per cent. and for April, 20 per cent.

The sales last month exceeded those of May, 1914, by 9 per cent., and May sales were 17 per cent. ahead of those for April of this year.

1913 Packard 48 driven by E. C. Patterson from Chicago to New York in 41 hours 37 minutes

# Lincoln Highway Saxon Completes 3,389-Mile Run

### Made Transcontinental Trip on Schedule—Averages 30 Miles Per Gallon of Fuel

DETROIT, MICH., July 7—*Special Telegram*—Arrival in San Francisco ended the 3,389-mile trip of the Lincoln Highway Saxon across the continent from New York. According to a dispatch the car reached destination July 4 on schedule, arriving in excellent mechanical condition and averaging 30 miles per gallon of gasoline and 150 miles per quart of oil on its long journey. This Saxon is the first automobile to traverse the Lincoln way on a continuous run, and the first car of its size and price ever to cross continent.

True Far-West hospitality marked the reception given car and drivers, M. A. Croker and Fred Wilkins, at the completion of the run. An escort party went 25 miles out of San Francisco and piloted the coast-to-coast Saxon into the city. Enthusiasm among the crowds that awaited the arrival of the car was at high pitch and many cheers went up when ocean-to-ocean traveler paraded streets of city.

Upon reaching San Francisco Pilot Croker drove the front wheels of the car into the Pacific ocean so as to make trip literally ocean-to-ocean run. He also emptied water carried from the Atlantic into the Pacific ocean.

The finish of the journey proved spectacular, the Saxon showing a remarkable burst of speed in covering the last 290 miles from Reno to San Francisco in 2 days. For part of the way, the road leads down hill across California, but the route in the Lake Tahoe district provides one of the severest tests in the way of mountain climbing on the whole Lincoln Highway.

The run of 186 miles in 1 day between Kimball, Neb., and Denver, Col., was the record mileage made by the coast-to-coast car. Runs of 170 miles and more were frequent west of the Mississippi, despite the fact that for the most part the road is almost a uphill climb.

Over all kinds of roads and hills and through all kinds of weather, this car maintained the schedule mapped out at the start of the run. It crossed long grades of the Alleghanies between New York and Canton, O., without requiring addition of water to radiator supply.

Before undertaking this trip, the same car made a run of 135 miles a day for 30 consecutive days in Detroit. The 4,050 miles covered on that occasion, coupled with distance of 3,389 miles across the Lincoln Highway, brought total for 60 days of travel up to 7,439 miles, or equivalent of 2 years' service in the hands of the average owner.

## Chicago To New York in 41 Hours

NEW YORK CITY, July 8—E. C. Patterson, the Chicago motor sportsman, reached this city last night in his non-motor-stop run from Chicago, covering the distance in 41 hours and 37 minutes. With a party of three in a 1913 Packard 48, he left Chicago at 3:58 a. m., Monday, July 6, and reached this city at 10:25 last night. Mr. Patterson with an assistant drove the car in 4-hour relays.

This trip was the outcome of the failure of the Chicago Automobile Club to stage its non-motor-stop night and day run from Chicago to Boston. Mr. Patterson was one of the prime movers in the projected contest, and when it fell by the wayside he decided to drive his own car under these conditions from Chicago to New York. He succeeded in all except that the motor stopped momentarily at Bryan, O., when filling with gasoline. Patterson had installed a small tank on the dash to supply the carbureter while the pressure was off the main gasoline tank for filling, and at Bryan the auxiliary tank on the dash was turned off a second too soon. With this exception the motor was kept running from start to finish.

The speedometer showed 1,025 miles covered, the route being by way of So. Bend, Toledo, Cleveland, Buffalo, Syracus, Albany, Poughkeepsie, and New York. Good weather was encountered all the way with the exception of rain from Syracuse to New York. Mr. Patterson carried two official observers appointed by the Chicago Automobile Club.

## New Management for Pullman Company

YORK, PA., July 6—H. W. Hayden, of Detroit, who was recently elected president of the Pullman Motor Car Co. of this city, is in entire control of the activities of the company. The other officers of the organization retain their interests in the business but leave the active management to Mr. Hayden.

# An Oldfield-Burman Match at Milwaukee Next Saturday

## A Purse of $10,000 and Championship Title Said To Be at Stake—Big Program for State Fair

MILWAUKEE, WIS., July 3—Bob Burman, speed king, and Barney Oldfield, former wearer of the crown, will meet in a match race at State Fair park, Milwaukee, for a purse of $10,000 and the title on Saturday afternoon, July 11. The state board of agriculture, after much deliberation, granted the use of the one-mile dirt circle for the first of the Burman-Oldfield series. It was necesary for the board to seek an opinion from the attorney-general of Wisconsin as to whether or not the July 11 race would prejudice a contract made by the board with Ernie Moross for a hippodrome exhibition on September 14, the first day of the annual state fair. The state's attorney opined that there would be no violation of the agreement, and the race was declared "on". The state board will cut in on the gate receipts in a sum sufficient to cover any damage that may be done to the track.

George W. Browne, a Milwaukee dealer, is handling arrangements for the match race. He is well known in the racing game, having taken a leading part in the management of the Vanderbilt and Grand Prix at Milwaukee in October, 1912. While the program has not been definitely settled, it is known that both Burman and Oldfield will put on several exhibitions before the main event, which will probably be at 50 miles, and give Milwaukee and visiting enthusiasts a run for their money. In the championship event Burman will use the Peugeot which Goux drove in the last Memorial day 500-mile, while Oldfield will drive the Blitzen Benz II.

At the agricultural board meeting, it was decided to make September 14, the first day of the state fair, "automobile day". Ernie Moross' troupe of barnstormers will put on a half dozen events and there will be no harness racing on that day. On September 18, the closing day of the fair, Oldfield will put on a race against Lincoln Beachey in an aeroplane. At the 1912 fair Beachey raced Oldfield in a Knox and managed to come out ahead. The board has arranged for the most extensive outdoor display of motor vehicles ever held in the middle west as part of the general state fair exhibits.

### Studebaker Averages 15.15 Miles a Gallon

BUFFALO, N. Y., July 5—The Studebaker six today finished its series of five 200-mile trips.

The fifth and final 200-mile run was run under most unfavorable conditions. Roads were wet and detours many. It averaged 15.2 gallons per mile and used 2 quarts of oil and 2 quarts of water. It used 13 1-4 gallons of gasoline for the trip.

The actual cost of operating the car, carrying six passengers, is $.0103 a mile. This figure is given on the basis of 1,000 miles of actual road travel, the total gasoline, oil and water cost for the 1,000 miles being added and divided into the total distance traveled.

The following tabulation gives the complete data on the five runs:

| | Distance | Gasoline, gallons | Oil, quarts | Water, quarts |
|---|---|---|---|---|
| First day | 204 | 14½ | 2 | 1 |
| Second day | 206.7 | 13½ | 2 | 3 |
| Third day | 189 | 12¼ | 1½ | *1 |
| Fourth day | 200.6 | 12½ | 2 | 1 |
| Fifth day | 200.6 | 13¼ | 2 | 2 |

*Pint.

Average mileage per gallon of gasoline, 15.15 miles.

Average mileage per gallon of oil, 421 miles.

Average mileage per gallon of water, 470 miles.

# A. A. A. Contest Rules for 1914 Promulgated

NEW YORK CITY, July 6—Several changes in the A. A. A. contest rules for 1914 have been made. Richard Kennerdell, chairman of the contest board of the A. A. A., has made a brief summary as follows:

#### Stock Car Rules

The rules governing speed competition of stock cars and stock chassis have been eliminated and a more simple method of registration of stock models for touring events has been provided. A less technical description of stock models must be filed with the contest board prior to any events in which the stock model is entered, and such certificate is turned over to the technical committee to check up the cars entered for competition in stock car touring events.

#### Classification

The Class "B" classification for stock chassis has been eliminated and a new subdivision has been made in the Class A Price Classification. Whereas formerly division 1A was for cars under $800, there are now two divisions, 1A for $450 and under 2A for $451 to $806.

In the same way three new classifications have been added to the Class C Piston Displacement Classification. Whereas formerly the smallest division was for cars under 161 cubic inches, the new classifications are:

| | | |
|---|---|---|
| Cyclecar | Division 1C | under 71 cubic inches |
| Light car | Division 2C | 71 to 100 cubic inches |
| Small car | Division 3C | 101 to 125 cubic inches |
| | Division 4C | 126 to 160 cubic inches |

The other divisions under Classes A and C remain the same.

#### Sanction Fees

Sanction fees remain the same with the exception that where heretofore events 100 miles or over on specially constructed speedways have carried a fee of $1,000 the following modifications have been made:

#### Road Races, Speedway Races, Beach Races, Track Races and Hill Climbs

No material changes have been made in these rules.

126. DIRECTION—Road races may be run in either direction over the course, provided, however, the pits must be located on the right side of the course in the direction in which the cars are traveling.

#### For Specially Constructed Speedways

| | |
|---|---|
| Brick, concrete, wood, etc. | |
| 100 miles and under, per day | $250 |
| 101 miles and over | 1000 |
| Dirt and other materials. | |
| 100 miles and under, per day | 250 |
| 101 miles and over | 750 |
| Dirt only. | |
| 100 miles and under, per day | 250 |
| 101 miles and over | 500 |

Where programs are composed entirely of events for cars under 125 cubic inches piston displacement or $450 in price, the sanction fees are 50 per cent. of those regularly prescribed. Where such events constitute only a portion of the day's program, the full fees will prevail.

CREW—In all speed events 100 miles or over the crew of a car must consist of driver and mechanician, and all mechanicians must be registered in the same way as drivers have been required to register since 1910. Attractive gold pins bearing the registry number are provided for registered drivers and mechanicians.

NO INTOXICANTS PERMITTED—A new rule has been incorporated strictly prohibiting the use of intoxicants in contests, under penalty of disqualification.

#### Touring Rules

The distinction heretofore existing between contests of 6 days and under and contests over 6 days in duration has been eliminated, and new grades for Interclub contests and Economy contests incorporated.

GRADE I covers technical contests embracing preliminary and final examinations, tests of motor, clutch, gearset and brakes, with penalties for damaged or inoperative parts, lateness at control and repairs and replacements.

GRADE II imposes penalties only for lateness and work done.

GRADE III imposes penalties for lateness in arrival at controls only.

GRADES I and II may be conducted for stock or non-stock cars, but Grade III is open only to non-stock cars.

Sanction fees for Grade II contests have been reduced to $30 and for Grade III contests to $10.

Stock car touring events may be conducted under price classification or piston displacement classification.

Touring cars and runabouts may compete together for the same price without reference to passenger carrying capacity.

TIRE REPAIRS—No penalty for tire repairs and replacements, and the time consumed is added to the daily running time. Extra casings and tubes may be removed from competing cars in controls for repairs. Motors may be stopped during tire repairs without penalty.

Demountable rims or wheels may be used in stock car events only where cars are regularly equipped.

The time lost on account of traffic delays occasioned by railroad crossings, congestion in city streets, open bridges, obstructed roadways, etc., will not be added to the daily running schedule, but such lost time must be made up by contesting cars.

DAILY RUNNING SCHEDULE—An average speed of 14 miles per hour has been set for cars priced at $450 and under, the former schedules of 16, 18 and 20 miles per hour remaining applicable to cars of $451 to $800, $801 to $1600 and over $1600.

PASSENGER LOAD—All cars are required to carry at least one passenger other than the driver without regard to body equipment or carrying capacity.

#### Batteries

Dry cells for ignition or lighting may be replaced without penalty, the work to be done on the car's running time.

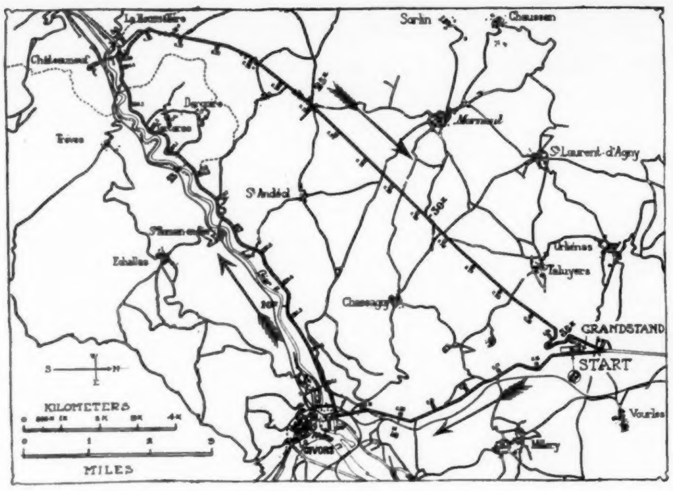
Replacing or recharging of storage batteries where charging generator is regular equipment will be penalized.

Replacing or recharging storage batteries where no charging means are furnished will be allowed without penalty.

#### Fixed Penalty Schedule

The fixed penalty schedule has been amplified to provide penalties for damaged or inoperative equipment such as self-starters, automatic gearshifts, two speed rear axles, lighting, shock absorbers, speedometers, horns, windshields, tops and similar accessories.

The rules have been simplified and rearranged, in so far as possible, so as to afford a more ready reference.



Map of the Grand Prix race course at Lyons, France, showing the difficult hairpin turns

## All Cars Are of Special Design

(*Continued from page* 65)

The amount of speed that the new Fiats are capable of, considering that their weight is under the limit of 2,425 pounds, is proof that this company has worked hard to solve the light motor car, using cylinders 3.9 x 5.6 bore and stroke. The valve mechanism has been described. Lubrication is under pressure to the three plain bearings and to the other parts of the motor but no oil is carried in the base chamber. Two pumps, one driven off the magneto shaft and the other from the camshaft, respectively draw the oil from the base chamber to the tank and deliver it from this tank to the bearings. In this way all the oil supply is carried on the dash where it is isolated from the heat of the motor.

Front wheel brakes are used, which are slightly smaller in diameter than those on the rear wheels. They are expanding types but not encased. The motor and gearbox form a unit construction with a multiple-disk clutch entirely inclosed. Torque and radius rods are not used as the drive is taken through the rear springs which are mounted under the axle and directly under the frame members.

Fiat has a narrow dummy front radiator forming a guard against flying stones and with the radiator proper a few inches back of it. A pure streamline form is maintained with the gasoline tank entirely hidden.

#### Alda Has Cantilever Springs

The Alda normally carries the radiator on the dash, but has moved it to the front in its present racing machines and leaves an opening in the pointed bonnet so as to get cooling effect while conserving the general lines of its stock car. It uses a motor with 3.7 x 6.3 inch bore and stroke with sixteen overhead valves. The hollow crankshaft is carried on five plain bearings; and the connecting rods are tubular ones made out of B. N. D. steel. Pistons are machined out of solid forgings. The makers declare the motor develops 128 horsepower at 2,800 revolutions per minute. Variable splash lubrication is employed with a large reserve oil tank located across the frame members amidship.

Cantilever springs are set directly under the frame members and are a feature of the car, the only other car in the race to use this type of spring being the Aquila-Italiana. Alda has carried out the streamline body effect by using a pointed tail which forms a locker within which two spare wheels are carried in a horizontal position. The upper part of the tail is hinged. The gasoline is carried in the dashboard tank.

The Opel car with cylinders 3.7 x 6.3 and using sixteen overhead valves, carries the crankshaft on five plain bearings and like all of the cars with the exception of Delage uses a four-speed gearset. Direct is on fourth. At the rear of the motor is a cross shaft which drives the water pump on one end and the magneto at the other.

#### Piccard-Pictet Almost Stock

The nearest approach to a stock car in the thirty-eight entered is the Piccard-Pictet sleeve-valve motor, built under Argyll license. The stock construction has been changed in that timing and compression are special and the reciprocating parts have been lightened. The cylinders are 3.8 x 5.9. The chassis is shorter than stock and carries front wheel brakes. In other respects stock design is adhered to.

#### Schneider Has Renault Hood

The Schneider uses a very compact block casting and has its eight overhead valves operated positively without springs. The cylinders 3.7 x 6.29 are mounted on crankcase secured direct to the frame members. The hollow crankshaft of B. N. D. steel is carried on R. B. F. roller bearings, this being the only example of roller bearings for crankshafts in any car.

The radiator design is distinctive in that the radiator is carried at the front of the motor, but the bonnet is a Renault type, extending ahead of the radiator and having a big wire gauze covering set in the front. By this design the car looks like the stock Schneiders which have their radiators back of the motor, Renault fashion. With this new design the radiator is in a position to get the full air blast and yet is protected from flying stones. The streamline effect is carried throughout the rear.

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### Lyons' Grand Prix Course Is Ideal

The course is of a spectacular nature. It is roughly triangular, 23.3 miles, and has to be covered twenty times, giving a total distance of 46.75 miles. The grandstands are on No. 1 leg 100 or 150 yards from the turn. The situation is ideal. Opposite, and just below the level of the road, is the line of tire and gasoline pits. Half a mile across country is a hill the winding road of which forms a part of the third leg of the course.

No. 1 leg of the course is comparatively easy. No. 2 has eighty turns in 8 miles. It is the portion of the course on which brakes have to give the best of service. Four or five of the turns look and are really dangerous. The others are treacherous. They look innocent, but a fraction of a second's inattention would be sufficient to bring the car in contact with the wall of rock on the right-hand side, or hurl it down the embankment into the vineyards on the left.

#### 120 Miles an Hour on Straightaway

At the end of the second leg there is a hairpin turn followed immediately by a winding climb a mile and a half long. It is followed by a perfect straightaway 7 miles long, of a switchback nature, on which speeds of 120 miles an hour should be attained. It is here that the value of a geared-up indirect drive will be appreciated. The straightaway finished, the drivers obtain a bird's-eye view of the grandstands in the valley below and commence their winding descent. At each of the hairpin turns the approaching leg is left open, so that a driver who has miscalculated his speed can run ahead for 200 or 300 yards. Stout wood barricades are put round the course at all points where spectators are likely to gather. Barricades are also put up in front of every house, even if it is an isolated one on a deserted open road. As a protection to drivers sand and cinders are banked around the outside of every turn to a height of 3 feet. A total of 150 tons of wood, having a length of 35,000 yards, is used to form barricades to keep spectators off the course.

## Specifications and Equipment of Cars Participating in the 300-Mile Sioux City Race

| Car | Driver | No. Cyl. | Bore and Stroke | Disp. | Mag. | No. Dist. | Plugs | No. | Carb. | Size | Wheel-base | Gear Ratio | TIRES Make | TIRES Front | TIRES Rear | Wheels | Oil |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Marmon... | Patschke.. | 4 | 5.5x7 | 445.0 | Bosch | 2 | Bosch | 8 | Schebler | 2 | 120 | 2.6 to 1 | Palmer | 34x4½ | 34x4½ | Houk | Monogram |
| White..... | Shrunk.... | 6 | 4.16x5.75 | 474.5 | Bosch | 1 | Bosch | 6 | White | 2¾ | 112 | 2¾ to 1 | Braender | 35x5 | 35x5 | Wood | Polarine |
| Chalmers.. | Wetmore.. | 6 | 4x5.5 | 414.7 | Bosch | 2 | Bosch | 12 | Rayfield | 2½ | 104 | 2¼ to 1 | Michelin | 32x4½ | 32x4½ | Houk | Monogram |
| Peugeot... | Burman... | 4 | 3.937x7.125 | 341.7 | Bosch | 1 | Bosch | 8 | Master | 2 | .... | 3 to 1 | Nassau | 34x4½ | 35x5 | R.W. | Castor |
| Peugeot... | Stringer... | 4 | 4 25x7.875 | 446.8 | Bosch | 1 | Bosch | 4 | Rayfield | 2½ | 108 | 2 to 1 | Batavia | 35x5 | 35x5 | R.W. | Castor |
| Peugeot... | Mulford... | 4 | 3.9x7.08 | 341.7 | Bosch | .. | Bosch | 8 | Zenith | ... | .... | 3 to 1 | Firestone Braender Palmer | .... | ... | R.W. | Castor |
| Duesenberg | Rickenbacher | 4 | 4.40x6.00 | 360.5 | Bosch | 1 | K.L.G. | .. | Schebler | ... | 106 | 2.6 to 1 | Riverside | 33x4½ | 35x5 | R.W. | Oilzum |
| Mason.... | Mason..... | 4 | 4.40x6.00 | 360.5 | Bosch | 1 | Champion | .. | Schebler | ... | 106 | 2.3 to 1 | Riverside | 33x4½ | 35x5 | R.W. | Oilzum |
| Duesenberg | Alley..... | 4 | 4.40x6.00 | 360.5 | Bosch | 1 | K.L.G. | .. | Schebler | ... | 106 | 2½ to 1 | Riverside | 33x4½ | 35x5 | R.W. | Oilzum |
| Sunbeam.. | Babcock... | 6 | 3.1x6.0 | 270.0 | Bosch | 2 | K.L.G. | 12 | Schebler | 1¾ | 116 | 3 to 1 | Palmer | 34.6x4.7 | ... | Wood & Sankey | Castor |
| Sunbeam.. | Grant..... | 6 | 3.14x5.9 | 275.0 | Bosch | 2 | K.L.G. | 12 | Claudel | ... | 83 | 3 to 1 | Palmer | 34x4½ | ... | Wood & Sankey | Castor |
| Stutz..... | Anderson.. | 4 | 4.8x5.75 | 416.2 | Bosch | 2 | Bosch | 8 | Schebler | ... | .... | .... | Silvertown | 33x4½ | 33x4½ | Houk | Monogram |
| Stutz..... | Oldfield... | 4 | 4.8x6.0 | 434.3 | Bosch | 2 | Bosch | 8 | Schebler | ... | .... | .... | Firestone | 34x4½ | 35x5 | Wood | Monogram |
| Mercer.... | Wishart... | 4 | 4.8x6.2 | 445.0 | Bosch | 2 | Bosch | 8 | Rayfield | ... | 112 | 2.5 to 1 | Palmer | 35x5 | 35x5 | R.W. | Castor |
| Braender.. | Chandler.. | 4 | 4.3x6.0 | 350.0 | Bosch | 2 | Bosch | 8 | Rayfield | ... | 105 | 2.38 to 1 | Braender | 33x4½ | 35x5 | Dunlop | Oilzum |
| Gray Fox.. | Wilcox.... | 4 | 5x5.5 | 431.9 | Bosch | 2 | Bosch | 8 | Rayfield | 2½ | 96 | 2.3 to 1 | Silvertown | 34x4½ | 34x4½ | R.W. | Castor |
| Delage.... | Knipper... | 4 | 4.1x7.08 | 380.2 | Bosch | 2 | Bosch | 8 | Claudel | 2¾ | 104 | 3 to 1 | Firestone | 34x4 | 35x4½ | R.W. | Castor |

NOTE.—All cars in the race were shaft driven

# Tire Troubles at Sioux City

(*Continued from page 71*)

looked over and the break sealed. At all of these stops fuel and oil were supplied, much of the latter being necessary because of the leakage. The last stop at 170 miles was for 55 seconds to change a right rear tire. He was called off at 252 miles.

The second Stutz entry, driven by Barney Oldfield, made three stops before it went out of the race with a cracked cylinder. Barney's first stop at 144 miles was for oil, water and fuel. At his next at 146 miles he came to the pits to clean the radiator, which was not cooling properly, and he also removed No. 4 ignition wire, thereby cutting out that cylinder which contained the crack. He attempted to continue on three cylinders, but withdrew the next lap.

The two Sunbeams, driven by Grant and Babcock, did creditable work up to the time of their retirement. Grant made two stops for right rear tires and at 262 miles he broke a universal on the back stretch and was out. His teammate, Babcock, made four stops.

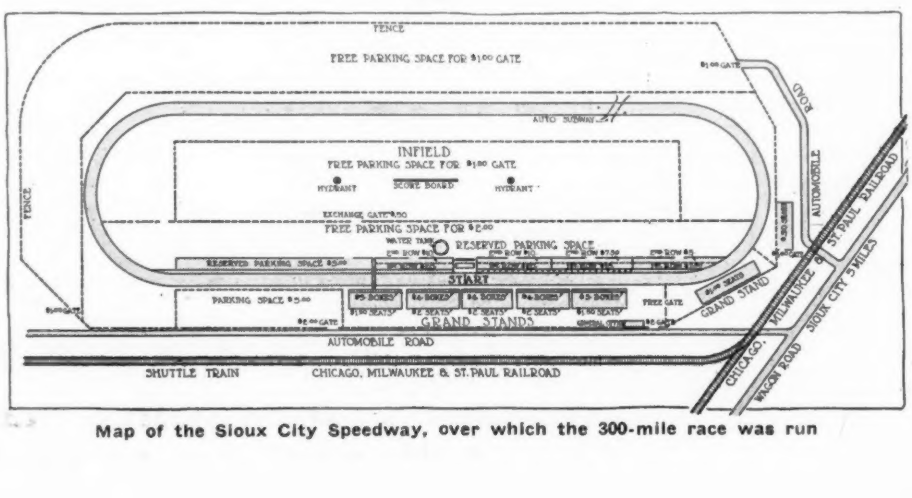
The second car to retire from the race was a Peugeot driven by Stringer. It broke a connecting-rod near the finish line at 86 miles. Previous to this a stop was made at 50 miles for a right rear tire, and considerable trouble was found in starting.

The first car to leave the course was the Mason, with Mason driving. At 4 miles he came in claiming no gasoline was flowing to the carbureter. He remained at the pits 30 seconds and after leaving went one lap and again came to the pits with a spark plug in No. 1 cylinder blown out. This was replaced and Mason only drove 50 feet when he broke the driveshaft.

One of the local entries, the White six, driven by Shrunk, remained at the pits for more than 2 hours, repairing and replacing two bearings. The center main bearing broke and one rod bearing seized.

Another local car which ran in hard luck was Wetmore's Chalmers six, which made thirteen stops, most of which were for what was supposed to be carbureter trouble. The first stop was at 10 miles to change a right front tire, and the second at 34 miles for a right rear. The carbureter trouble began at 46 miles and it appeared that the fuel was full of water and dirt. The air line to the tank was giving trouble also. After making adjustments the car continued, but the motor still misfired badly. Two more tire changes were necessary at 64 miles, both rear tires being taken off. He was flagged off at 176 miles.

Burman was out at 160 miles with a broken crankcase, connecting-rod and piston. The bearing no doubt was not fed any oil, it seized, then bent the steel connecting-rod which left the crankshaft and punched through the crankcase. Burman made three stops before retiring, the first at 32 miles, when a left rear tire was punctured. His next was at 114 miles for a new right rear tire.



Map of the Sioux City Speedway, over which the 300-mile race was run

J. S. Bretz celebrated the 4th of July in Europe because

# F & S

# BALL BEARINGS

# Finished 1-2-3

## in the 1914 Grand Prix de France!

| Time | Time | Time |
|---|---|---|
| 1—Mercedes 7.08.18 | 2—Mercedes 7.09.54 | 3—Mercedes 7.13.15 |
| Lautenschlager (65.55 m. p. h. for 467.5 miles.) | Wagner | Salzer |

All three mounted exclusively on F & S Ball Bearings, defeating in this, the world's classic road race, the best racing creations of France, England, Italy and Switzerland, over a decidedly winding country circuit of 23.3 miles of 20 laps.

Thus does—History repeat itself again,
In this German Mercedes win;
For a stern chase is a long chase,
When F & S Bearings make the pace.

# Factory Miscellany

**COUNCIL Bluffs May Have Plant**—That it would be practicable to manufacture automobiles in Council Bluffs, Ia., has been proven within the last few weeks at the Keys Bros.' Carriage factory at Twenty-eighth street and First avenue. Two sample cars were completed a few days ago and a thorough test has shown them to be equal to any make of the same size. The "Keys Car" is a five-passenger, 40-horsepower machine with a 112-inch wheelbase and a modern streamline body. The motor is from the Buda factory, four cylinders 4⅛ by 5¼. The body of the machine is from the Michigan Body works.

**Excelsior Tool Co. Adds**—The Excelsior Tool & Machine Co., East St. Louis, Ill., has begun the construction work on its recently announced addition and will soon seek the necessary equipment.

**R-C-H Plant Bought**—The power plant and some other buildings, all told a ground 200 by 400 feet, being part of the general plant of the bankrupt R-C-H Corp., Detroit, Mich., have been purchased by the General Ice Delivery Co., Detroit.

**Carter Carburetor's New Building**—The Carter Carburetor Co., St. Louis, Mo., of which C. O. Baxter is president, has bought a new factory building and will install equipment for the manufacture of carbureters, and also erect and equip a brass foundry on adjoining vacant land.

**Another Ford Plant**—The growth of the Ford Motor Co. of Canada, Ltd., is illustrated by the number of new branches being established. It is erecting a large plant on Christie street, Toronto, a site for a plant is being excavated at Montreal, and now comes the announcement that property has been purchased at London, Ont., for a new assembling plant.

**Will Make New Spring**—P. Walter Fay, of the Warren Garage Co., Worcester, Mass., has formed a company to start the manufacture of the new spring for motor vehicles for which he received a patent a short time ago. Daniel T. Higgins and John J. Barry have joined the company, and the springs will be turned out in a shop on Vine street for the present.

**Reo's Three New Buildings**—The Reo Motor Car Co., Lansing, Mich., has three new buildings under construction which will greatly increase the capacity of its plant. The additions will consist of a forge shop and power house, 96 by 225 feet; a machine shop, 95 by 560 feet. both one story, and a three-story erecting and painting shop, 144 by 256 feet. Machinery of the latest type will be installed.

**Visiting Cambridge Plants**—Many civic and other bodies are taking advantage of the opportunity to visit the big plants of the Gray & Davis Co. and the Ford Motor Car Co., located near each other on the boulevard in Cambridge, Mass. One of the recent gatherings at both places was that of Mayor Good, members of the board of aldermen and city council and the board of trade of Cambridge, who spent several hours going through both places.

**$395 Car in Lansing**—Lansing, Mich., is to have another automobile manufacturing concern, which will build a car to sell at $395. Those interested are Messrs. Thomas and Walls, who are busy just now with the incorporation formalities, the capital stock of the concern to be $250,000. The Chamber of Commerce, which had appointed a special committee to hear the promoters, heard a report from its members, which, after a thorough investigation, decided to provide the funds for the construction of a model car which is expected to be ready within 30 days.

**Monorail in Buick Plant**—A three-story fireproof building is being erected by the Buick Motor Co., Flint, Mich., for its enamel plant. In addition to the standard equipment of the modern enameling plant in the Buick building will be installed the monorail system for moving the raw material and the finished product to the various parts of the factory. There will be fifteen ovens and two high speed electric elevators of 4,000 pounds capacity each. There will be washed air ventilation, dustless floors, ice cooled drinking fountains of running water, well lighted and sanitary lunch and locker rooms and shower baths for the employees.

**New Auto Tractor Plant**—The Auto Tractor Co.'s new plant in Niles, Mich., is nearing completion. It is a one-story structure, 100 by 115 feet, with a monitor in the center having a clear span of 33 feet. The roof is supported by a traveling crane to serve the center bay of the building. The factory is located on the South Bend division of the M. C. R. R. Machinery will be installed within the next 10 days. The officers of the company are W. H. Zimmerman, president; F. J. Plyn, vice-president, and F. S. Hadfield, secretary-treasurer. The company makes a specialty of manufacturing farm tractors for attaching to all standard makes and sizes of automobiles.

**Will Manufacture Tire Holders**—The Rimolox Tire Carrier Co., Evansville, Ind., has been incorporated with $20,000 capital stock to manufacture tire holders or supports. The directors are M. A. Strouse, A. Harnishfeger and W. N. Erskine.

**Electric Welding Co. Adds**—The Electric Welding & Products Co., 2206 Clarkwood avenue, Cleveland, O., manufacturer of automobile supplies and screws, will build a one-story, 45 by 123 foot brick addition to its plant.

## The Automobile Calendar

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| July 13-14 | Seattle, Wash., Track Races, Seattle Speedway Assn. |
| July 25-26 | Belgium Grand Prix Road Races. |
| July-August | French Army Truck Subsidy Trials. |
| Aug. 1-3 | Galveston, Tex., Beach Races. |
| Aug. 2-9 | Grenoble, Automobile Club of France's 6-Day Motorcycle and Cyclecar Reliability Contest in French Alps. |
| Aug. 16 | Le Mans, France, Automobile Club de la Sarthe's Coupé International Light-Car Race, 1 liter, 400 maximum cylinder area, 350-500 kilos weight. |
| Aug. 17 | Le Mans, France, Auto Club de la Sarthe's Grand Prize de France for 4½ liter cars. |
| Aug. 21-22 | Chicago, Ill., Elgin Road Races, Chicago Automobile Club. |
| Aug. 23 | Auvergne, France, Coupé de l'Auto Race. |
| Aug. 27 | Brooklands Track, England; Annual Automobile Race. |
| Aug. | Denver, Colo., 650-mile Run, Colorado Springs to Salt Lake City. |
| Aug. | Russia, Road Race, Coupe de l'Empereur, 2,500 miles. |
| Sept. 6-7 | Brescia, Italy, Auto Club of Italy's 4½-liter Grand Prize. |
| Sept. 6-7-8 | Newark, N. J., Cyclecar Reliability Tour to Atlantic City. |
| Sept. 7-14 | Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn. |
| Sept. 9 | Corona, Cal., Road Race, Corona Auto Assn. |
| Sept. 10 | Portsmouth, Eng., Autumn Conference, Institute of Metals. |
| Sept. 10-15 | Berlin, Germany, German 4½-liter race. |
| Sept. 15-Oct. 11 | New York City, Commercial Tercentenary Celebration. |
| Sept. 26 | Brooklands Track, England, Annual Automobile Race. |
| Sept. 26-Oct. 6 | Berlin, Germany, Automobile Show. |
| Oct. | Philadelphia, Pa., E. V. A. A. Annual Convention. |
| Oct. 7-17 | New York City Electric Vehicle Show, Grand Central Palace. |
| Oct. 9-Nov. 2 | S. A. E. European Trip. |
| Oct. 16-26 | Paris, France, Automobile Salon. |
| Oct. 17-24 | Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc. |
| Oct. 19, 20, 21 | Philadelphia, Pa., Elec. Veh. Assn's Convention. |
| Oct. 19-26 | Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A. |
| Oct. 28-31 | Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium. |
| November | El Paso, Tex., Phoenix Road Race, El Paso Auto Club. |
| Nov. 6-14 | London, England; Olympia Show. |
| Nov. 8-9 | El Paso to Phoenix, Ariz., Automobile Race. |
| November 8-11 | Shreveport, La., Track Meet, Shreveport Auto Club. |
| November 15 | Paris, France, Kerosene Motor Competition. |
| Jan. 2-9 | New York City, Annual Automobile Show, Grand Central Palace. |
| Jan. 23-30 | Chicago, Ill., Automobile Show, First Regiment Armory. |